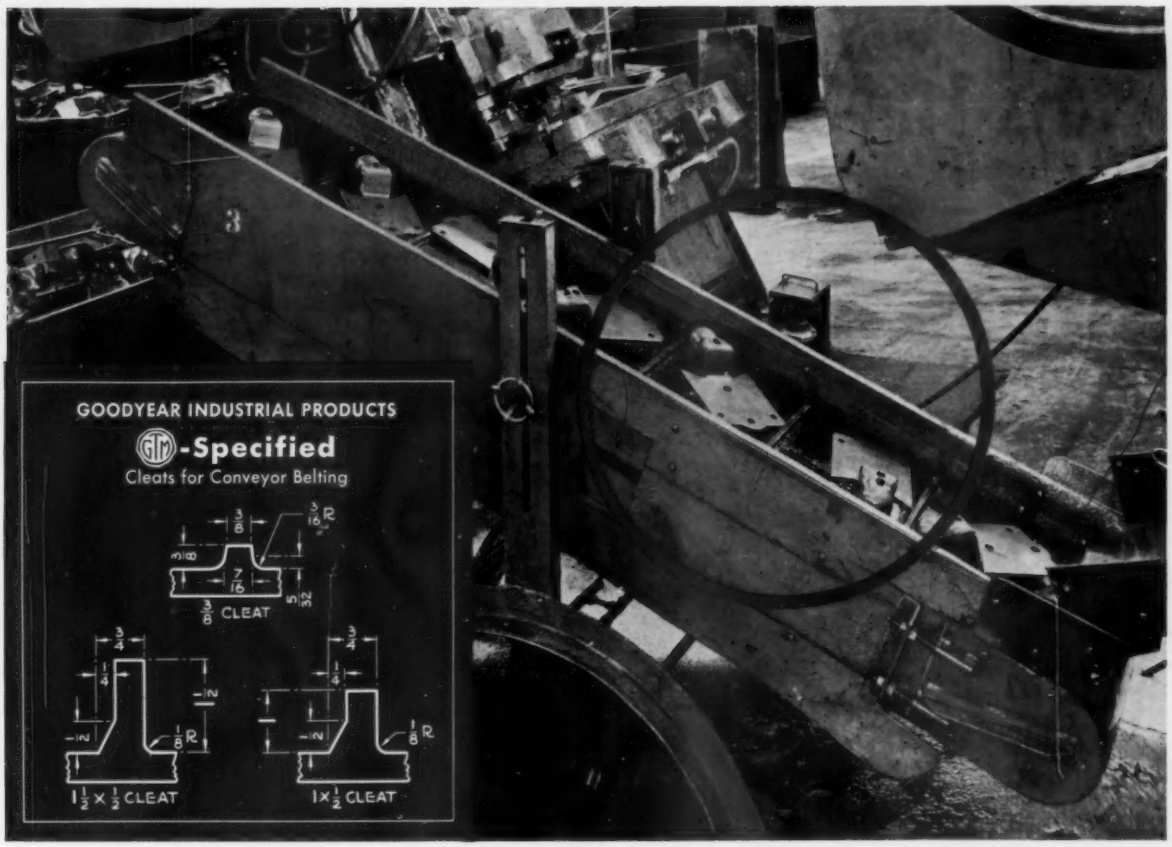


They're raising production—and lowering costs by ⅓

Portable conveyors—between production lines on different levels—were a "must" at this Midwestern automotive parts plant. But the specially constructed belts they used soon cut and flaked off. They became oil-soaked and accumulated dust—dirtying the parts. Worse still, they stretched—had to be taken up every 6 weeks. Even then, none lasted more than a year.

Then the G.T.M.—Goodyear Technical Man—recommended Style ORS Cleated Belts. They're made of rubber especially compounded for extreme resistance to oil, cutting and abrasion. And the tough, firm-gripping cleats are molded right into the rubber for durability.

The savings are impressive: The G.T.M.'s less-expensive belts eliminated the need for parts washing. And after 3 straight years of full service—*three times the life of competitive belts*—they're still going strong.

Like to have savings like these on your production lines? The fastest way to find out is to call the G.T.M. He'll be Johnny-on-the-spot if you contact your Goodyear Distributor—or write Goodyear, Industrial Products Division, Akron 16, Ohio.

• • •

IT'S SMART TO DO BUSINESS *with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*

CONVEYOR BELTING BY

GOODYEAR

60 GOODYEAR ANNIVERSARY

THE GREATEST NAME IN RUBBER

For more facts circle 502 on Reply Card

RICHARD H. MORRIS
Editorial Director

EDITORIAL STAFF

THOMAS E. HANSON, *Editor*
R. L. MARINELLO, *Managing Editor*
EMIL B. SKUBIK, *Associate Editor*
H. E. B. ANDERSON, *Associate Editor*
M. E. WEISSMAN, *Associate Editor*
M. E. HENIKEN, *Equipment Editor*
VERNON T. KEMPF, *Electrical Editor*
MILDRED NOVOSEL, *Editorial Assistant*
BEA BERGHORN, *Editorial Production*
FLORENCE JARRETT, *Editorial Assistant*
JAMES E. WILCOX, *Art Director*
RICHARD TREFILEK, *Staff Artist*
TED CIEPLEY, *Draftsman*
ALICE WHEATLEY, *Artist-Draftsman*

Technical Publishing Co.
308 E. James St.
Barrington, Ill.

KINGSLEY L. RICE, *President*
EDWIN C. PROUTY, *Exec. Vice Pres.*
EDWIN C. PROUTY, JR., *Secretary*
ARTHUR L. RICE, JR., *Treasurer*
ANDREW W. KRAMER, *Tech. Asst. to Pres.*
JOHN O. AARVOLD, *Prod. Manager*
WM. J. SALKELD, *Asst. Prod. Mgr.*
EUGENE ZUCKER, *Research Director*
JOSEPHINE GEAR, *Asst. Adv. Mgr.*

DISTRICT MANAGERS

BOSTON & NEW ENGLAND
Charles R. Lippold
5 Spring St.
Riverside, Conn.
Phone: NEptune 7-2210

NEW YORK: Richard Y. Fuller
1613 Graybar Bldg., New York 17, N. Y.
Phone: MUrray Hill 5-3779

PHILADELPHIA: Oscar Wilds
1235 Jericho Road, Abington, Pa.
Phone: TUrner 7-6688

JOHN R. MORRISON
Western Sales Manager

CHICAGO: John R. Morrison
Walter Painter
Robert L. Dickson
110 S. Dearborn St., Chicago 3, Ill.
Phone: DEarborn 2-5453

OHIO-MICHIGAN:
Robert L. Dewey
557 W. Glenwood St.
N. Canton, Ohio
Phone: HYacinth 9-7593

PITTSBURGH: James B. Tafel
404 Frick Bldg., Pittsburgh, Pa.
Phone COurt 1-4878

DENVER: McDonald-Thompson
Robert H. Heidersbach
222 Colorado Nat'l Bank Bldg.
Denver 2, Colo.
Phone: KEystone 4-4669

PACIFIC COAST: McDonald-Thompson
J. Leslie Meek, 625 Market St.
San Francisco 5, Cal. Phone: YUkon 6-0647

Connie J. Grabb, 3727 West Sixth Street
Los Angeles 5, Cal. Phone DUnkirk 7-5391

Harry Abney, 1008 Western Ave.
Seattle 4, Wash. Phone MAin 3-3766

SOUTHWEST: McDonald-Thompson
Frank N. Vickrey, Rm. 214
3217 Montrose Blvd., Houston 6, Texas
Phone: JAckson 9-6711

Ted R. Trautman, 2010 South Utica
Tulsa 4, Okla. Phone: RIverside 3-1981

BPA NBP

Copyright 1958 by Technical Publishing Co.

'ROUND ABOUT

with the editors in field and office

Edited by R. L. Marinello

Plant Engineer Presented Award

Arthur F. Delong, plant engineer with Exide Industrial Division, The Electric Storage Battery Company, Philadelphia, Pa., has been named recipient of the 1958 Meritorious Service Award of the Philadelphia Chapter, Society for the Advancement of Management.

Delong was honored primarily for contributions made over the past 10 years in conducting monthly seminars on plant maintenance problems.

Born in Philadelphia, he studied at Drexel Institute of Technology, earning his degree in mechanical engineering there in 1948. In subsequent business associations he worked for SKF Industries, The Budd Company and Essex Rubber Company.

Solar Heating Studied by BRI

MEMBERS OF THE Building Research Institute will hold their Seventh Annual Meeting at the Shoreham Hotel, Washington, D. C. on April 21 through the 23. One of the many subjects to be discussed at this meeting will be on the types of building materials to be used for solar heating.

John I. Yellott, executive director of the Association for Applied Solar Energy, will describe a test home now under construction in Phoenix which will be both heated and cooled by solar energy. He will also be quizzed by a panel of mechanical engineers and architects on the future of solar heating and the ways in which building design and construction materials should be modified to utilize its potential.

In addition, members will participate in a diversified technical program covering future economic and population trends as they relate to building, fire protection of buildings, a review of new building materials, new surface wiring systems and other developments.

Program and registration information may be obtained by writing to Harold Horowitz, Technical Secretary, Building Research Institute, 2101 Constitution Ave., Washington 25, D.C.

Care of Fixed Foam Systems

NEW SAFETY CODE on the care of fixed foam systems is available to industry. This booklet discusses the three most popular types of foam systems now in use—chemical foam, indoor foam and outdoor foam.

These three systems provide fire protection for flammable liquids in quantities from a few gallons to millions of barrels. The code covers such procedures as recharging, pipe drainage, checking air aspirating devices, hydrostatic testing, inspection of operating mechanisms and calibrating pressure gages. When properly employed, these procedures and the others covered in the code will insure effective use and long life for the systems.

To get a copy of the brochure "Safety Code for Inspection, Maintenance and Protection of Fixed Foam Systems" send your request to Fire Equipment Manufacturers' Association, Inc., Suite 759, One Gateway Center, Pittsburgh 22, Pennsylvania.

Appointments at Ryerson

Herbert G. Dent has been named engineering consultant to the vice president in charge of operations at Joseph T. Ryerson & Son, Inc., Chicago, Illinois. Suceeding Dent as director of plant engineering is **Stanley J. Miller,** formerly assistant director. Both men will headquarter in the firm's general offices in Chicago.

H. G. Dent

S. J. Miller

Starting with the company in 1912 as a cost clerk in the Chicago plant,

Subscriptions: U.S.A. $10, Canada $11. Other countries $12 per year. Single copies $1. Change of address: Send to PLANT ENGINEERING, Circulation Division, Barrington, Illinois. Please supply position title, company name, company address. Request must reach us by 15th of month to make the change effective with following month's issue. Published monthly and accepted as controlled circulation publication at Chicago, Ill.

Increasing deoxidation—a key step in the manufacture of new 4-D Wrought Iron.

Now—from Byers Research—
an even better Wrought Iron
for modern corrosion control—

new 4-D wrought iron

Out of the laboratory and into production comes a newly formulated Wrought Iron to strengthen man's arsenal of corrosion resistant weapons.

New 4-D Wrought Iron is at least 25% *more* corrosion resistant than standard Wrought Iron—long an industry standard for superior corrosion resistance. This significant metallurgical advance is the result of 17 years of continuing research by Byers metallurgists.

And here's what it means to you.

Seventeen-year in-service and laboratory tests prove that 4-D Wrought Iron is superior not only to standard Wrought Iron, but has much greater corrosion resistance than other materials which are sometimes offered as substitutes. Thus, the economy of using standard Wrought Iron can now be compounded through the use of new 4-D Wrought Iron.

In addition to increased corrosion resistance, new 4-D Wrought Iron has greater uniformity and improved physical and mechanical properties. This is attained by substantially increasing the deoxidation of the base metal, increasing its phosphorous content, and using a more siliceous slag.

And the price of new 4-D Wrought Iron? No increase. Despite higher production costs, the price of Wrought Iron will remain the same.

Write us for new 4-D Wrought Iron literature, or contact the Byers representative for complete details. A. M. Byers Company, Clark Building, Pittsburgh 22, Pa.

BYERS Wrought Iron Tubular and Hot Rolled Products

ALSO ELECTRIC FURNACE AMBALLOY STEEL PRODUCTS AND PVC PIPE

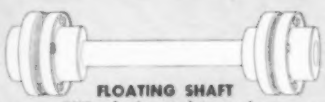
Corrosion costs you more than Wrought Iron

For more facts circle 503 on Reply Card

Specify
THOMAS
ALL METAL
FLEXIBLE COUPLINGS
FOR MAINTENANCE FREE POWER TRANSMISSION on PUMP, COMPRESSOR, MARINE and OTHER DRIVES

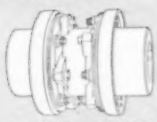
DBZ — for high speed, heavy duty drives

Thomas' 40 years of flexible coupling experience is at your disposal to help you meet ordinary applications or special variations for unusual cases.



FLOATING SHAFT
BMR — for heavy duty service with excessive misalignment

SINGLE FLEXING
SS — for engine-driven generator sets with out-board bearings



DOUBLE FLEXING
AMR — for engine and medium speed drives

UNDER LOAD and MISALIGNMENT ONLY THOMAS FLEXIBLE COUPLINGS OFFER ALL THESE ADVANTAGES.

1 Freedom from Backlash Torsional Rigidity
2 Free End Float
3 Smooth Continuous Drive with Constant Rotational Velocity
4 Visual Inspection While in Operation
5 Original Balance for Life
6 No Lubrication
7 No Wearing Parts
8 No Maintenance

Write for Engineering Catalog

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U. S. A.

For more facts circle 504 on Reply Card

'ROUND ABOUT

Dent became a time study man and plant layout specialist. When the industrial engineering department, which he headed for many years, was changed to the plant engineering division in 1956, Dent was appointed its first director.

Miller began his career with the company in 1941. He served as superintendent of the company's Detroit plant from 1949 to 1954, and was warehouse superintendent at Chicago for two years before his appointment as assistant director of the plant engineering division in 1957.

Western Conferences

DURING THE first two days of the Western Material Handling Show, the American Material Handling Society has arranged a two-day conference. The conference will be held on the Show grounds, at the Great Western Exhibit Center, on May 8 and 9.

Some of the subjects which will be discussed at the conference are: Planning and space layout for material handling, covering building planning, production space layout and material space layout. Warehousing operational techniques, covering use of storage aids, small parts handling and issue and wholesale operating techniques.

Other subjects will be: Material handling equipment, covering selection, application and maintenance. Receiving and shipping, covering organization, operation and control of receiving and shipping departments.

Inquiries and registration requests should be directed to the Conference General Chairman, Robert J. Muth, Electric Storage Battery Co., 1043 South Grand Ave., Los Angeles, Calif.

The Western Air Conditioning Industries Association will hold their 1958 Conference and Exhibit at the Shrine Exposition Hall, Los Angeles, from May 7 through the 11.

Further information about the conference or exhibit may be obtained by writing to Fred J. Tabery, 3443 South Hill Street, Los Angeles 7, California.

Children's Drawings Describe Parents' Jobs

HAVE YOU ever considered how your job is visualized through the eyes of your children? You'd be surprised at the amount of detail they see in your work.

A good example of this can be seen in Western Electric Company's 1958 calendar. The calendar illustrations are children's drawings of the work their fathers or mothers are doing at Western Electric.

In the January illustration, a girl artist, 11 years young, tells how her dad installs wire. For November, an 11 year old boy shows how his dad inspects the plant. Illustrations show his dad doing the following things: He makes you wear safety glasses; he checks water-gas piping; he helps prevent accidents; he stops you from piling boxes too high; and he checks fire equipment.

Some of the other illustrations show dad busy making data processing equipment, welding, painting, handling radar equipment, or mother operating the switchboard or inspecting parts.

Engineer Gets New Appointment

Elroy C. Carlson has been named staff engineer of the Georgia-Pacific Corporation. He was formerly with United States Plywood Company.

Prior to his last position, Carlson was plant engineer with the M and M Wood Working Company at its Lyons, Oregon, plywood plant. He has also been a plant engineer for Timber Structures, Inc., and a mechanical engineer for Pacific, Power & Light Co.

Determining Required Torque

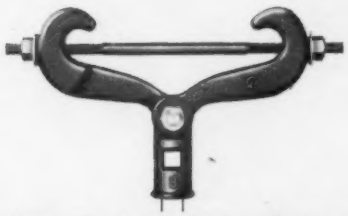
ACCORDING TO a special report prepared by Skidmore-Wilhelm Manufacturing Company, the problem of applying the required torque is not solved by merely tightening a bolt as far as it will go. In fact, an overstressed bolt can fail just as easily as one which isn't tight enough.

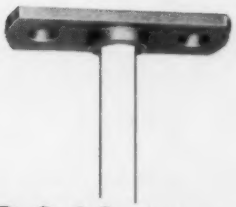
The following factors are the main ones to consider in determining the proper torque: size of bolt, type of nut and washer and type of thread. With these facts in mind, it is then necessary to consider the manner in which torquing energy is distributed when a bolt is tightened.

This report points out that only 10 per cent of the applied torque creates tension in the bolt itself. Other sections of the report cover torque-tension data, applications of data plus a practical example. Three tables provide such information as: effect of different nut and washer combinations on torque-tension relationship; torque-tension data; and ultimate strength of bolts.

Copies of this report may be obtained by writing to Skidmore-Wilhelm Manufacturing Company, 442 South Green Road, South Euclid (Cleveland), Ohio.

RUGGED STRENGTH... LESS WEIGHT





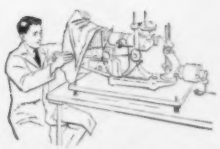
Grinnell *MALLEABLE IRON* Pipe Hangers

The fluidity of molten white iron allows casting of malleable pipe hangers in any desired form. Such hangers, designed in a manner consistent with the best malleable practice, are cast so closely to dimensions that subsequent shaping is not required.

Controlled annealing in the most modern equipment is employed to produce hangers having uniform internal grain structure, superiority ductility, high strength and freedom from casting strains. Quality controls in our foundries — such as hourly checks of metal, daily photomicrographs of metallurgical structure, tensile tests of sample bars from each melt — insure the rugged, lightweight strength of Grinnell malleable iron pipe hangers.

This start-to-finish manufacture by Grinnell assures malleable iron pipe hangers with a minimum safety factor of 5 or more, based on the ultimate tensile strength of the material.

The A.S.A. Code permits the use of malleable iron pipe clamps, embracing the pipe, when the temperature of the pipe does not exceed 450°F. When it does exceed this temperature, malleable iron may still be used in beam clamps, hanger flanges and the like if the malleable part is 12 inches or more distant from the pipe.



Testing metal structure with photomicrograph

***Every* Grinnell Malleable Iron Pipe Hanger offers . . .**

- Safety Factor of at least 5
- Thickness of metal increased at points of concentrated stress
- Homogeneous metal composition throughout
- Extremely high resistance to impact and corrosion
- Economy
- Heat resistance up to 450°F

GRINNELL

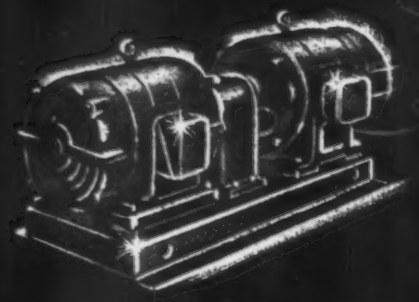
AMERICA'S #1 SUPPLIER OF PIPE HANGERS AND SUPPORTS

Grinnell Company, Inc., Providence, Rhode Island — **Coast-to-Coast Network of Branch Warehouses and Distributors**

Manufacturer of: pipe fittings • welding fittings • forged steel flanges • steel nipples • engineered pipe hangers and supports Thermolier unit heaters • Grinnell-Saunders diaphragm valves • prefabricated piping • Grinnell automatic fire protection systems

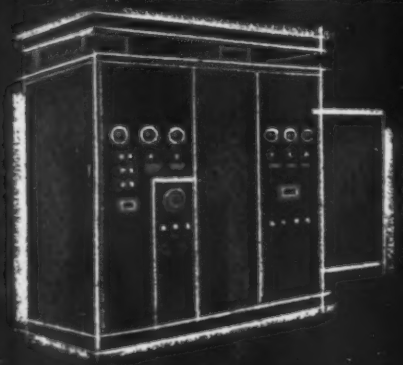
For more facts circle 505 on Reply Card

1 Precise high-frequency drives for generators or converters



Because of its exact speed characteristic, the Syncro-Spede is an ideal driver for high-frequency generator sets where precise frequency is a necessity. The elimination of slip provides exact frequency throughout the entire load range of the motor.

2 Precise timing, metering, and recording devices



Syncro-Spede delivers and maintains exact synchronous speed within rated capacity regardless of load or line voltage dips. Its design permits mechanical modifications to meet special needs. Since it eliminates error caused by speed fluctuations, this new Louis Allis motor is also ideal for memory drums and precision timing devices.

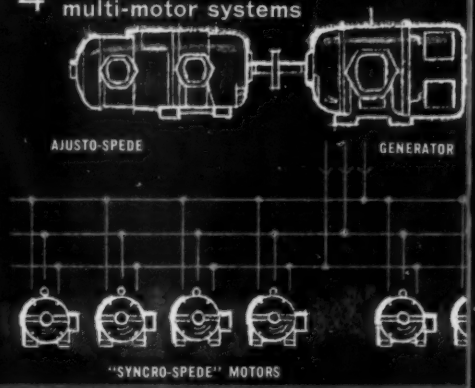
3 Constant single- or multi-speed conveyor drives

Syncro-Spede gearmotors can provide exact constant conveyor speed — or maintain correct relation of several conveyors operating at different speeds. Used with Louis Allis gear drives, the Syncro-Spede offers a practical, low-cost solution to low-speed conveyor drive requirements —down to 7.5 rpm.

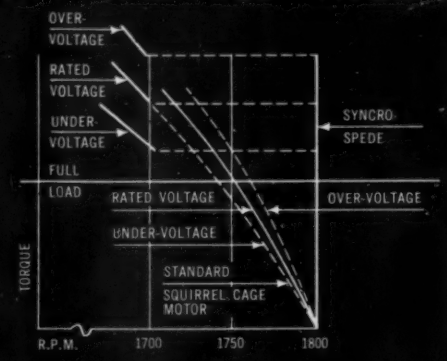
Below values are typical values based upon 100% pull-in torque with the external inertia equal to no more than twice the rotor inertia. To obtain full load and locked amps for other standard low voltages, multiply below 220 volt values by the inverse ratio of the voltages. For applications with high external inertias, refer to factory with specific inertia values.

HP	Synch. RPM	Frame Size	Full Load Amps 220 V.	% Locked Rotor Torque	Locked Amps 220 V.	Full Load Power Factor	Full Load Efficiency	Rotor WK²
1	1800 1200	182 184	4.4 4.6	275 200	30 30	59 58	76 75	.18 .22
1.5	1800 1200	184 184	6.6 7.0	265 200	41 41	59 58	76 75	.18 .24
2	1800 1200	184 213	7.7 8.3	250 200	58 58	64 62	82 78	.22 .49
3	1800 1200	213 215	11 14	250 200	83 83	67 61	82 78	.49 .80
5	1800 1200	215 254U	17 21	200 175	120 120	68 61	85 82	.80 1.30
7.5	1800 1200	254U 256U	25 28	200 175	170 170	68 62	86 83	1.30 1.80
10	1800 1200	256U 284U	34 36	200 175	240 240	68 63	85 83	1.80 3.50
15	1800 1200	284U 326U	49 54	200 165	330 330	70 63	86 84	3.0 5.50
20	1800 1200	286U 326U	63 65	200 150	420 420	70 64	87 85	5.00 5.50
25	1800	324U	79	200	520	70	87	6.0
30	1800	326U	95	200	700	70		7.0

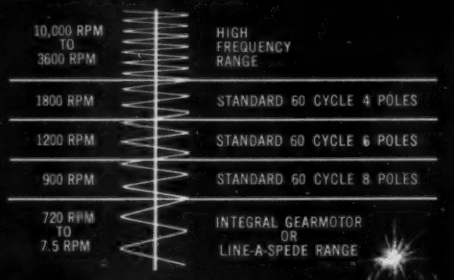
4 Adjustable frequency multi-motor systems



5 Any constant speed requirement



6 High speed — high frequency operation

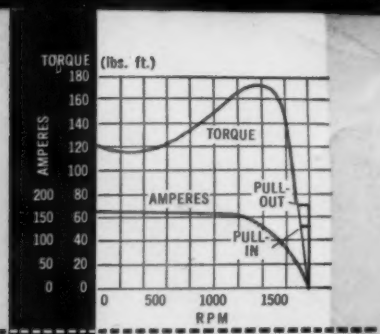


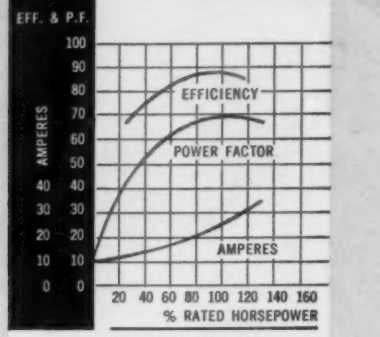
Syncro-Spede motors of different ratings and output speeds can be synchronized from a single adjustable frequency source — motors of various speeds will hold their exact relationship within an operating frequency range of 5 to 1,000 cycles. This combination provides precise adjustable frequency power for many applications in the printing, paper, plastic, and textile industries.

The Syncro-Spede offers virtually unlimited usage. It is much smaller than equivalent reluctance and DC excited synchronous motors—outperforms both and costs less. Under full load conditions, a standard squirrel cage induction motor may vary between 1740 and 1760 rpm with a 10% voltage variation — the Syncro-Spede maintains exact synchronous speed.

Syncro-Spede's indestructible cast aluminum rotor is designed for high-speed — high frequency operation. The small diameter rotor enables the motor to attain speeds previously impossible with other types of synchronous motors. With special rotor designs, the Syncro-Spede can reach speeds of 10,000 rpm and higher.

New-product news from Louis Allis





IMPROVED PERFORMANCE DATA

The Louis Allis Syncro-Spede

...a synchronous motor built in the same NEMA frames as standard motors of equal horsepower!

It's compact, simple, versatile...and trouble-free!

The remarkable Louis Allis Syncro-Spede® Motor enables you to provide exact synchronous speed for *any* application for less cost — with fewer controls — and in less space than previously possible.

If your equipment or operation calls for precise constant speed, check the advantages this new motor offers you:

Space-saving design — The revolutionary Syncro-Spede needs no external excitation, wound rotating fields, collector rings or brushes. It's built in the same standard NEMA frames as ordinary induction motors of equal horsepower. It requires less space — is virtually maintenance-free.

Wide range of enclosures — The Syncro-Spede can be provided in a wide variety of enclosures to meet special operating requirements. For example, Syncro-Spede is readily available in totally-enclosed fan-cooled and explosion proof enclosures — thus permitting installations which were difficult to make with D.C. excited synchronous motors.

Unmatched versatility — Syncro-Spede is available in standard sizes up to 100 hp, and even larger ratings for special applications. It can also be furnished in a wide range of mechanical modifications . . . base- or flange-mounted — as a gearmotor or brakemotor — even as a rolled-shell shaftless motor for "built-in" applications.

For full particulars and expert application engineering help, contact your local Louis Allis District Office. Or write for Bulletin No. 1900 to The Louis Allis Co., 434 East Stewart Street, Milwaukee 1, Wisconsin.

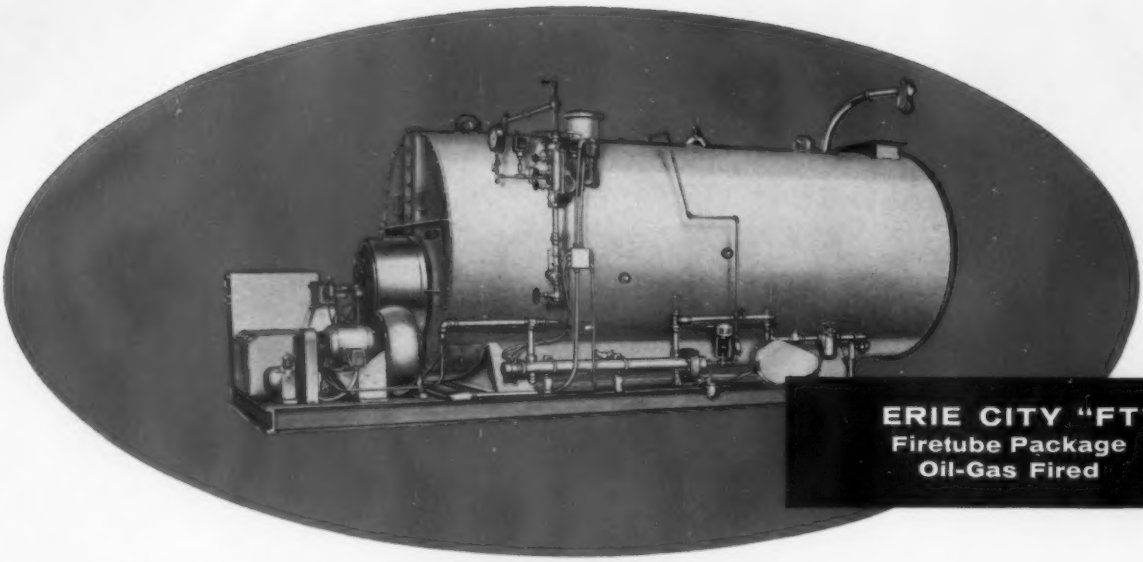
Syncro-Spede is a Trademark of The Louis Allis Company

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

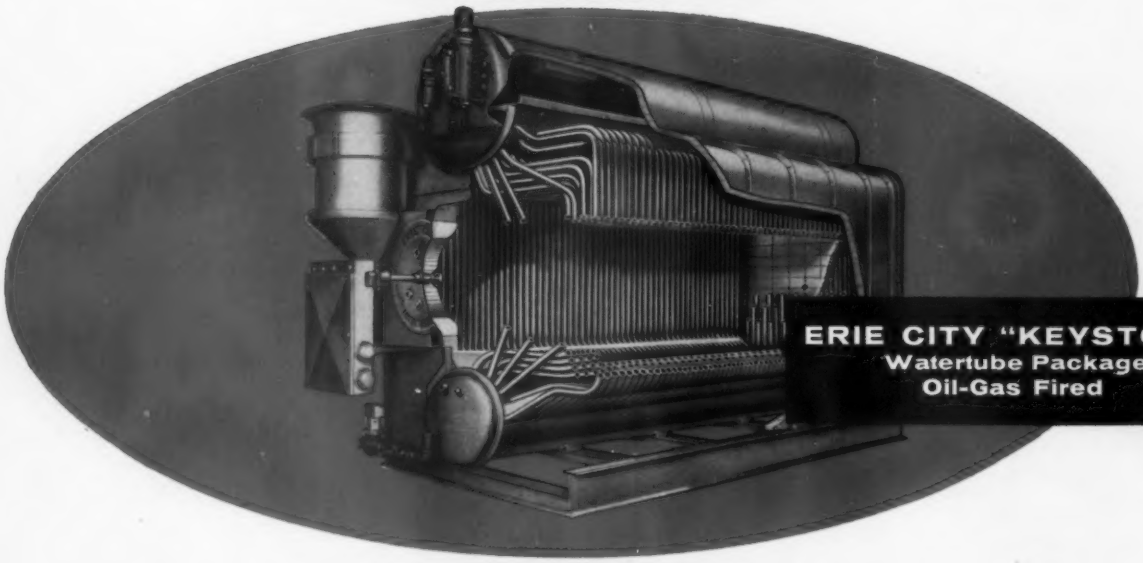
LA-140

For more facts circle 506 on Reply Card

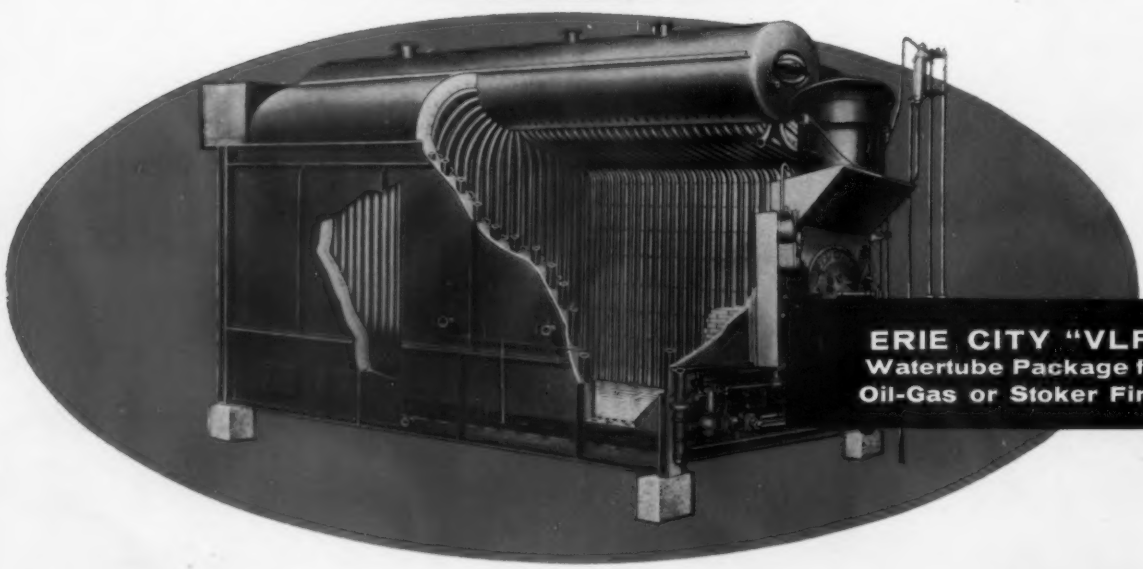
LOUIS ALLIS



ERIE CITY "FT"
Firetube Package
Oil-Gas Fired



ERIE CITY "KEYSTONE"
Watertube Package
Oil-Gas Fired



ERIE CITY "VLP"
Watertube Package for
Oil-Gas or Stoker Fired

Why shop around for Package Boilers?

Thinking about a new boiler these days? Maybe a package boiler! Sounds like a good idea because many people like this new concept of undivided responsibility. But what kind should we get? Firetube? . . . Watertube? Should it be oil fired, gas fired, arranged for future stoker firing; or which combination of these would be best for us?

The best place to find unbiased answers to your questions is Erie City Iron Works—a pioneer in the boiler industry and a leader in the package steam generator field. Erie City manufactures both firetube and watertube package units. Without prejudice their engineers can point out the advantages of both types.

After hearing the pros and cons of each, you may decide on the firetube type. Erie City offers its modern "FT" Package Boiler arranged with Erie City air atomizing oil gun and/or ring type gas burner. The "FT" Fire Tube Package unit is built to highest quality standards—not down to a price. It is a three pass design with gas vent at the rear and pressurized, using forced draft to provide precise control of excess air and CO_2. A centrifugal fan is used, which coupled to a closed combustion chamber, results in unusually quiet operation. No costly foundation—no expensive stack—no brickwork are required.

If a watertube boiler is your choice, you have two types available from Erie City. One is the KEYSTONE, the most compact water tube package available, arranged with a steam atomizing oil gun and/or ring type gas burner. The KEYSTONE is a baffleless, two drum unit completely water cooled with a seal welded inner casing and bolted outer casing for pressurized operation. No costly foundation—no expensive stack—no brickwork are required.

The other choice for a watertube package is the VLP. Your plant may be located in an area where gas, oil and coal are all available. At first you may decide to fire with oil or gas but desire the proper provision for future coal firing. The boiler for you to install is an Erie City VLP arranged for present oil and gas firing but with the furnace PROPERLY PROPORTIONED for the future installation of an underfeed or spreader stoker.

All Erie City package units come complete with burners, fans and safety and combustion controls, piped, wired and mounted on the boiler. No field work required—just make basic fuel, water, steam and electric connections and you're ready for operation.

Both the air atomizing and steam atomizing burners are of Erie City's own design and manufacture. No division of responsibility here. Qualified service engineers will assist at start up and instruct your operating personnel. In the case of the VLP, your boiler will be properly designed for future conversion to either Erie City underfeed or spreader stoker firing. Again, no division of responsibility.

Don't let the selection of a new boiler become an unnecessary problem. Write and let Erie City help make the proper selection of a package steam generator for you.

"FT" Cat. SB5683D

"KEYSTONE" Cat. SB5983D

"VLP" Cat. SB5783D

• *You can depend on* ERIE CITY Since 1840 *for sound engineering*

ERIE CITY IRON WORKS *Erie, Pennsylvania*

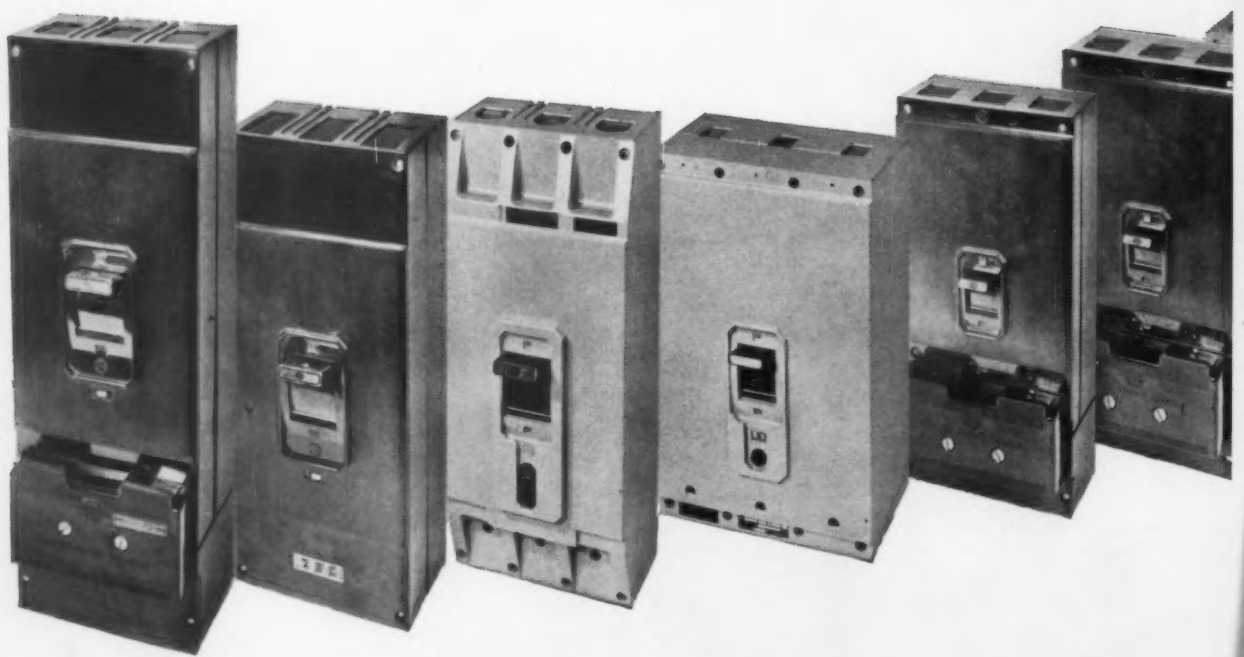
STEAM GENERATORS • SUPERHEATERS • ECONOMIZERS • AIR PREHEATERS • WASTE HEAT BOILERS
FIRE and WATER TUBE PACKAGE BOILERS • OIL and GAS BURNERS • STOKERS • PULVERIZERS

For more facts circle 507 on Reply Card

MOLDED CASE CIRCUIT BREAKERS

YOU GET "EXTRA QUALITY —AT NO EXTRA COST"

in Industry's Most Complete and Diversified Line



From the smallest circuit breakers for lighting circuit protection, through I-T-E's exclusive Cordons—with 100,000 amp interrupting capacities—to the many special-purpose breakers, such as the 400 cycle, 1000 v selective trip breaker designed for Navy use, I-T-E molded case circuit breakers constitute industry's most complete line.

Not only is the I-T-E line the most complete and most diversified, but I-T-E's famed "extra quality—at no extra cost" is built into every product which bears the I-T-E label. And you can depend on the nation-wide network of I-T-E distributors and field engineers to give you second-to-none service. I-T-E Circuit Breaker Co., Small Air Circuit Breaker Division, 19th and Hamilton Streets, Philadelphia 30.

I-T-E CIRCUIT BREAKER COMPANY

PHILADELPHIA, PENNSYLVANIA

With *Productive Maintenance* in action

Shell Chemical makes big repair jobs routine . . .

Four key motors totaling 7500 hp overhauled in 96 hours

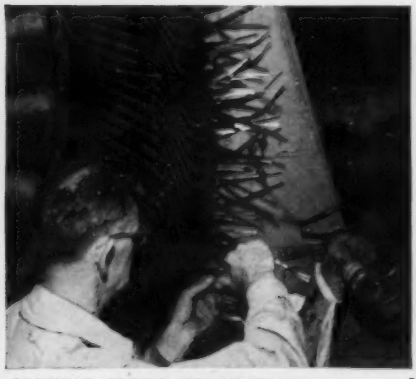
On-the-job overhaul by G-E Service Shop made the difference when Shell had to complete major overhaul in 4 days

At Shell Chemical's plant in Pittsburg, Calif., a recent *Productive* Maintenance project called for the planned overhaul of four large synchronous motors by General Electric's San Francisco Service Shop. Shell's schedule allowed only 96 hours to complete work on all four motors. Thus, fast service was a "must."

General Electric's San Francisco Service Shop, working closely with Shell personnel, scheduled a crew of 24 men to work in two 12-hour shifts. They began with a midnight shift, continued round-the-clock, and ended four days later, *on time.*

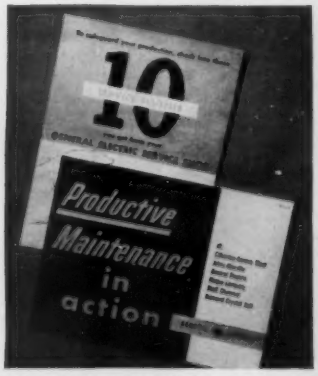
What Shell's Experience Means To You. The next time you schedule major overhauls or any electric repair service call *your* General Electric Service Shop. It is part of a nationwide organization having facilities strategically located to give you complete repair and overhaul service. You get speed, unmatched quality, and experience—*and it's as near as your telephone.*

For additional information, write today for the bulletins shown below, to General Electric Company, Section 690-4, Schenectady 5, N. Y.



MAKING SERIES CONNECTION on one of Shell's 1750-hp synchronous motors required the experienced skill of this G-E San Francisco Service Shop repair specialist.

IMPORTANT PART OF JOB at Shell Chemical was cleaning air ducts with special G-E solvent. Workmen used unique brush to achieve this and wore a mask as a safety measure.



FREE BULLETINS tell how you can make maintenance profitable: GED-3465, "Ten Service Benefits," and GED-3278, "P-M in Action."

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 509 on Reply Card

Drill

Model 75 completes over 36,000 drillings for this company on one job without maintenance or repair. The foreman* on the job said: "Didn't think they would hold up running continuously, but they did and finished the job on time."

Close-up shot showing continuous drilling assignment in ⅛" hot rolled steel plate. The owner* says: "We are standardizing on SKIL Drills. We have had our present Model 75s over a year. Although they have had many days of rough continuous use, we have yet to have them serviced."

holes by the thousands *continuously* with SKIL Drills!

because SKILMANSHIP prevents overheating, burn-outs, fatigue

Avoid loss of production time waiting for drill motors and housings to cool. Eliminate constant brush changes. Reduce operator fatigue due to loss of drill power.

SKILMANSHIP distinguishes the SKIL line of drills from all others. It means the ability to take continuous production drilling and stand up. For example, the SKIL Model 75 was used to drill over 36,000 holes in ⅛" hot rolled steel plate. Ordinarily, a drill would not hold up under such extensive drilling in tough steel. Unable to purchase a stationary drill press, the company had to use the Model 75 and the job was finished on schedule. No time was lost in maintenance or repair.

At another company the Model 75 drills 1000 holes in sheet metal units—one right after the other—without heating up. The same quality is evident in all sizes of SKIL Drills. The big 1" Model 163 drill makes more than 100 drillings in 1" steel beams in *50% less time* than a radial drill press. It is faster because it can take continuous drilling.

SKIL has the complete line of drills—from ¼" to 1"—each built to do any job faster and take continuous drilling. This SKILMANSHIP quality prevents motor overheating, burn-outs or operator fatigue. Ask your SKIL distributor for a Proof Test of any one of these tools.

"STANDARDIZE ON SKIL." Every day more companies adopt this slogan. Factory-branch service stations located in 33 major cities throughout the country are equipped to give prompt and dependable service on all SKIL Tools, so it pays to "standardize on SKIL." Look for the SKIL trademark in the yellow pages of your phone directory.

SKIL

Made only by SKIL Corporation, manufacturer of famous SKIL and SKILSAW products, 5033 Elston Avenue, Chicago 30, Illinois. In Canada: 3601 Dundas Street West, Toronto 9, Ontario.

This trailer company* uses SKIL Model 243 heavy-duty ¼" drill to turn out about 3500 holes per unit—fast. "We need drills that can take it," says the foreman, "and the Model 243 runs continuously until the job is finished."

The plant engineer* in this industrial shop states that the SKIL Model 163 Drill is 50% faster than previous methods of drilling. These 1" steel beams require more than 100 drillings—one right after another.

For more facts circle 510 on Reply Card

*Names supplied upon request

WHAT'S SPECIAL ABOUT LJUNGSTROM®

structural details?

. . . many things.

And all make air preheating with a Ljungstrom more economical, less troublesome. The Ljungstrom offers these refinements:

- The welded steel rotor is strong enough to support the heating elements without strain, yet flexible enough to withstand extreme temperature variations.
- An inspection port and strategically located access doors reveal any maintenance needs and make replacement work routine.
- A mass flow soot blower is installed as original equipment at the cold end where deposits are most apt to accumulate.
- The hot end heating surface is made from open hearth steel sheet and the cold end from heavier gauge, low-alloy corrosion-resisting material because corrosion is normally confined to the cold end.

The Air Preheater Corp. is constantly working to improve Ljungstrom heating surfaces, seals, bearings, and other structural details. And, in general, these improvements can be applied to existing units with only minor changes and at nominal cost. Another reason why seven out of ten air preheating installations are Ljungstrom. For the full story on how the Ljungstrom design and construction can cut your fuel costs, increase plant efficiency, write for our 38-page manual.

The Air Preheater Corporation, 60 EAST 42ND STREET, NEW YORK 17, N. Y.

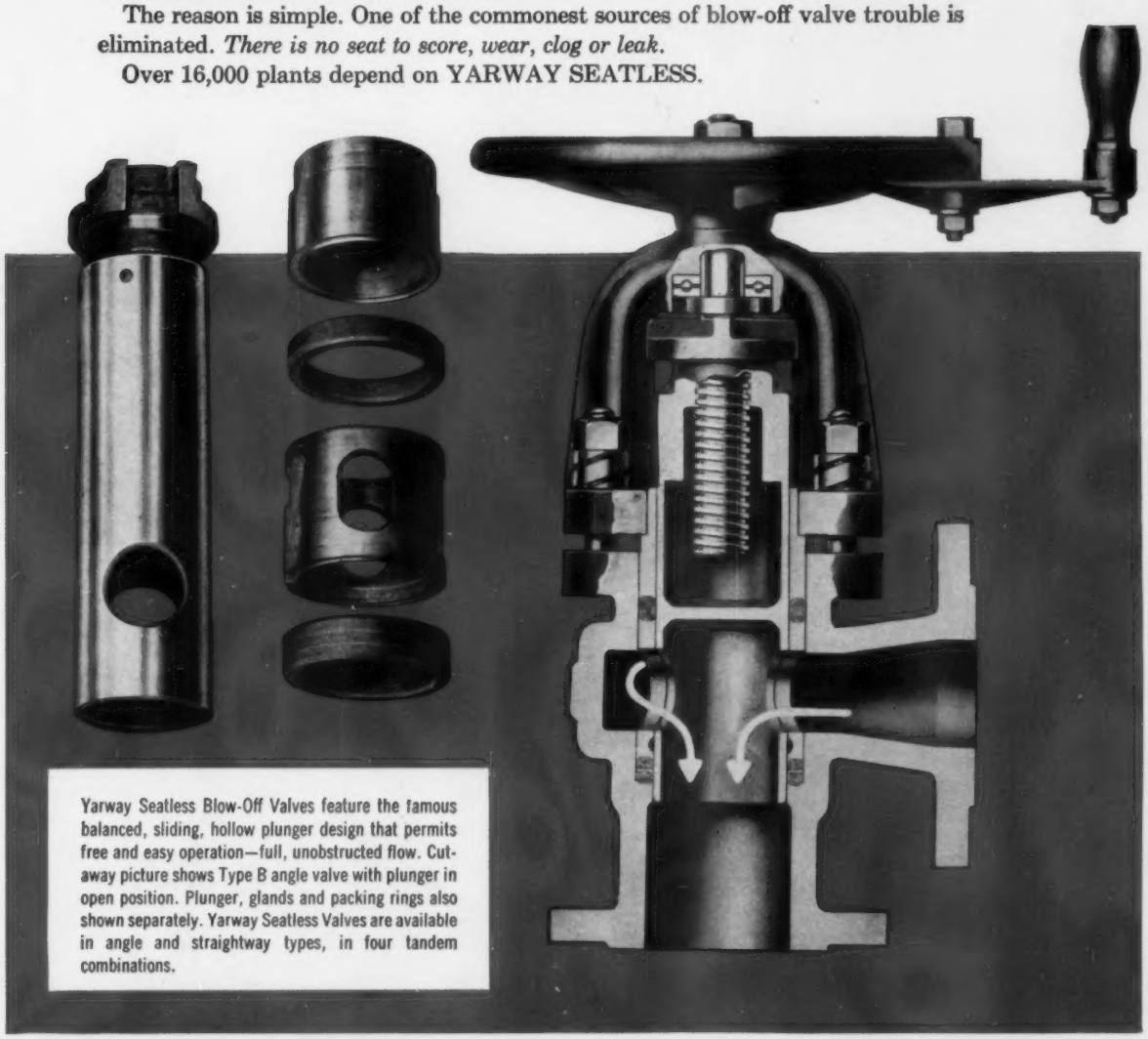
For more facts circle 511 on Reply Card

seatless means savings

For nearly 50 years boiler plants in low and medium pressure ranges have been saving maintenance time and down-time thanks to dependable, trouble-free blow-down service from Yarway Seatless Blow-Off Valves.

The reason is simple. One of the commonest sources of blow-off valve trouble is eliminated. *There is no seat to score, wear, clog or leak.*

Over 16,000 plants depend on YARWAY SEATLESS.



Yarway Seatless Blow-Off Valves feature the famous balanced, sliding, hollow plunger design that permits free and easy operation—full, unobstructed flow. Cut-away picture shows Type B angle valve with plunger in open position. Plunger, glands and packing rings also shown separately. Yarway Seatless Valves are available in angle and straightway types, in four tandem combinations.

For information on Yarway Seatless Valves, sizes, materials, pressures, etc., write

YARNALL-WARING COMPANY 145 Mermaid Ave., Philadelphia 18, Pa.
BRANCH OFFICES IN PRINCIPAL CITIES

YARWAY SEATLESS ...a good way to specify blow-off valves.

For more facts circle 512 on Reply Card

Westinghouse Life-Line "A" motors save $200 a year in rewinding costs alone

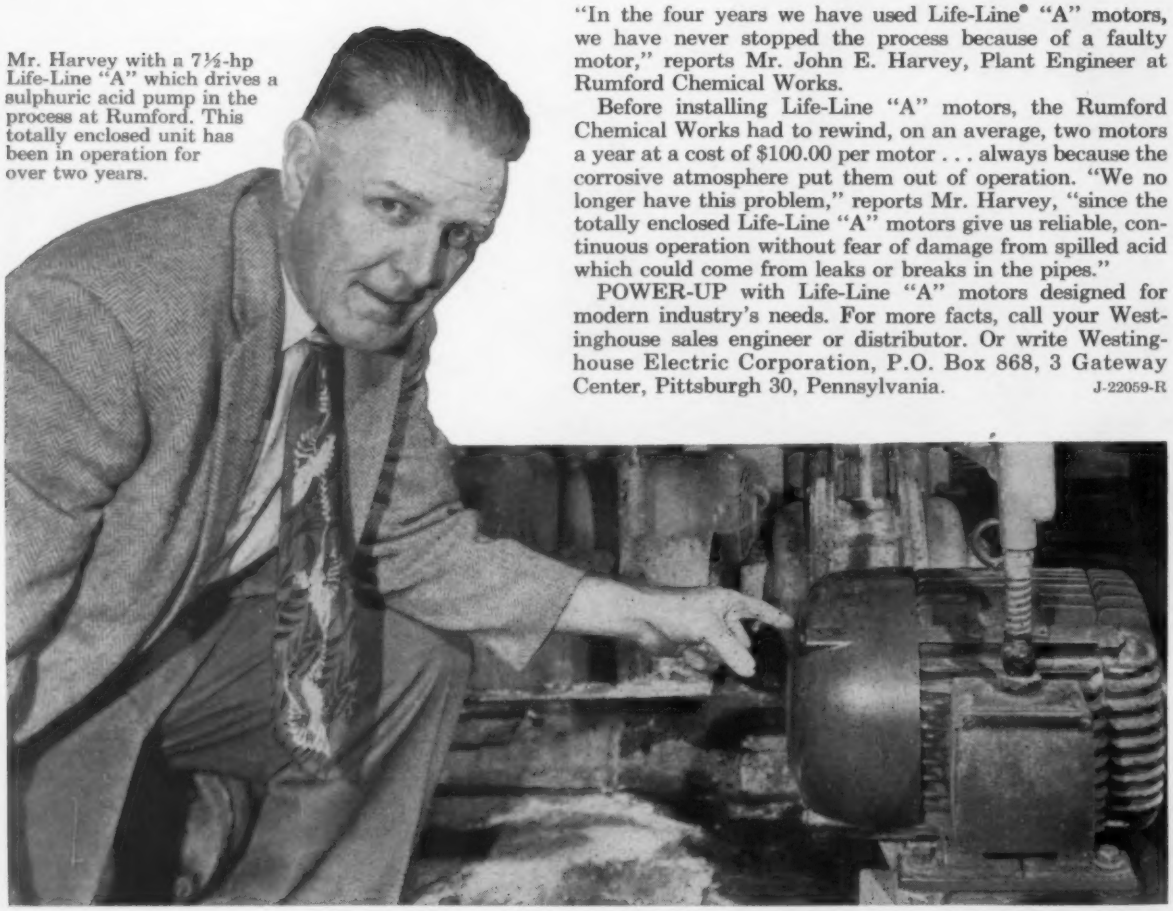
... at Rumford Chemical Works, Rumford, R.I.

Westinghouse motors are reliable for 24-hour, 7-day week operation in sulphuric acid manufacture

"In the four years we have used Life-Line® "A" motors, we have never stopped the process because of a faulty motor," reports Mr. John E. Harvey, Plant Engineer at Rumford Chemical Works.

Before installing Life-Line "A" motors, the Rumford Chemical Works had to rewind, on an average, two motors a year at a cost of $100.00 per motor . . . always because the corrosive atmosphere put them out of operation. "We no longer have this problem," reports Mr. Harvey, "since the totally enclosed Life-Line "A" motors give us reliable, continuous operation without fear of damage from spilled acid which could come from leaks or breaks in the pipes."

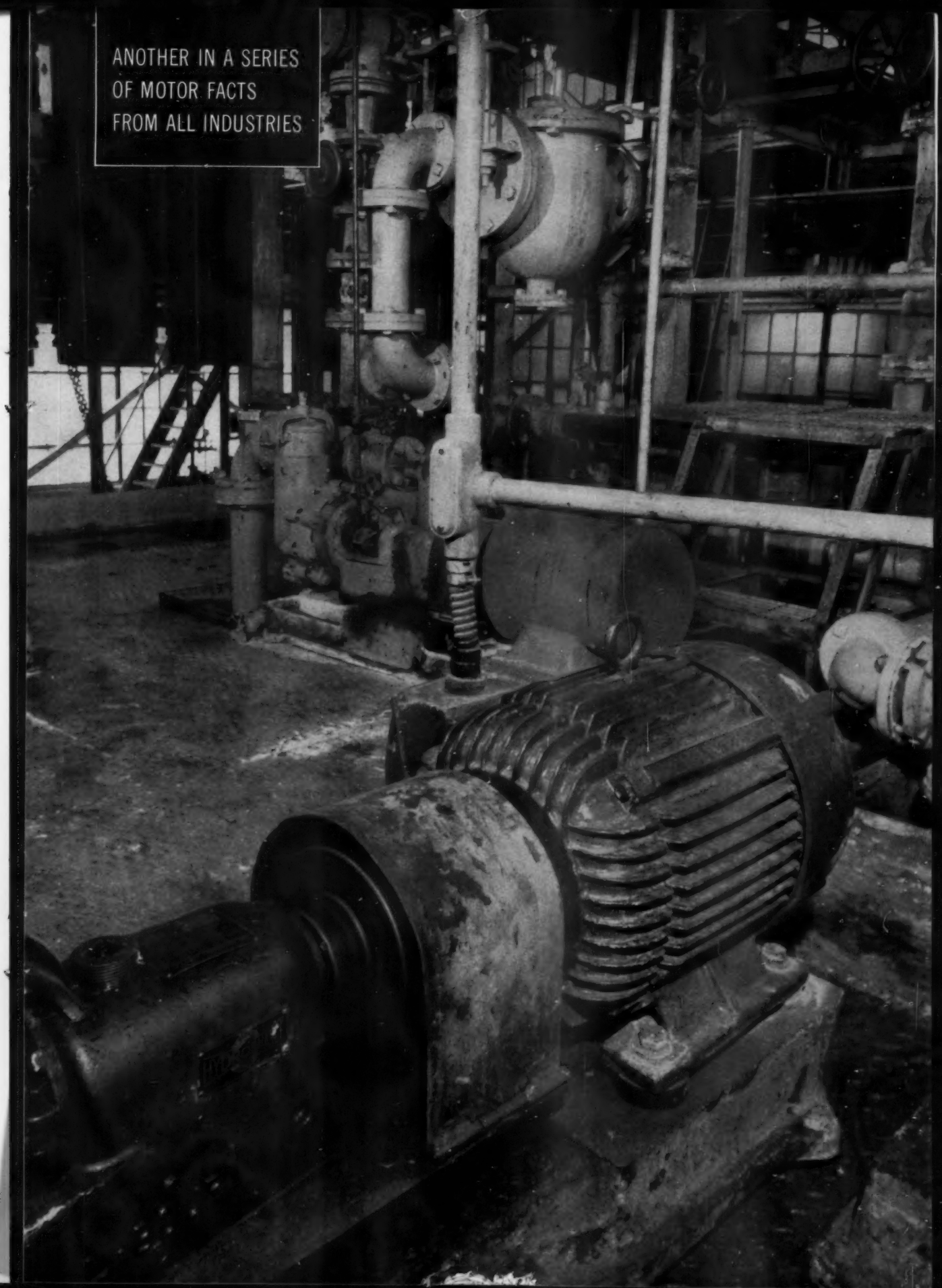
POWER-UP with Life-Line "A" motors designed for modern industry's needs. For more facts, call your Westinghouse sales engineer or distributor. Or write Westinghouse Electric Corporation, P.O. Box 868, 3 Gateway Center, Pittsburgh 30, Pennsylvania. J-22059-R



Mr. Harvey with a 7½-hp Life-Line "A" which drives a sulphuric acid pump in the process at Rumford. This totally enclosed unit has been in operation for over two years.

YOU CAN BE SURE ... IF IT'S Westinghouse

For more facts circle 513 on Reply Card

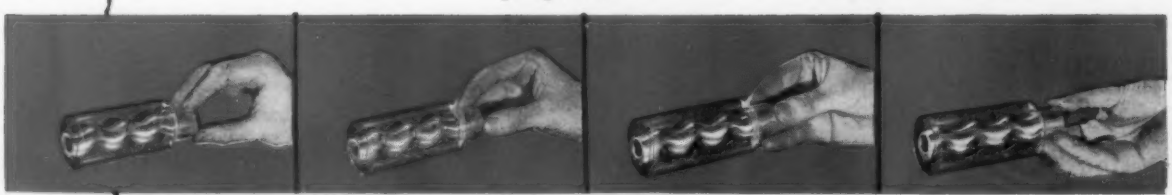

ANOTHER IN A SERIES
OF MOTOR FACTS
FROM ALL INDUSTRIES

from abrasive slurries to delicate foods...

MOYNO® PUMPS

CUT HANDLING COSTS

The Moyno "progressing cavity" pumping **principle has enabled** thousands of plants to pipe difficult materials that were transported by hand and other expensive means. Moyno is the only pump that can handle many abrasives, pastes, slurries, chemicals, foods, suspended solids, etc. without foaming, aerating, crushing or excessive pump wear.



As shown above, Moyno Pumps have a screw-like rotor that revolves in a double threaded stator creating progressing cavities which smoothly move material through the pump. They will pump anything that will move through a pipe . . . even plaster and non-pourable pastes!

Moyno Pumps are available in capacities up to 500 gpm and pressures up to 1000 psi.

Examine your processing methods. No doubt there are several places where Moyno Pumps can drastically cut costs. Ask us, we'll give you a frank answer. Send us an outline of your problem today! Write for Bulletin 30-PE

ROBBINS & MYERS, INC.

SPRINGFIELD, OHIO | BRANTFORD, ONTARIO

Motors | Fans | Hoists | Moyno® Pumps | Propellair® (Industrial) Fans

For more facts circle 514 on Reply Card

BULLETINS just released and of immediate plant interest

MATERIALS HANDLING

101 Electric Hoists—Bulletin E-58, 24 pp, lists six types of electric hoists, including lug suspension, plain trolley, geared trolley, four-wheel motor driven trolley, variable speed motor driven trolley and close headroom units with lifting capacities of ½ to 10 tons. Construction features of internal mechanisms are explained through cutaway diagram. Fundamentals of operation, duty cycle formulas, outlines dimensions, weights, types of reeving, and other data given. Wright Hoist Div., American Chain & Cable Co., Inc.

102 Hoist Selection—This 8-pp catalog section details seven steps to be taken to select proper electric wire rope hoist to meet job requirements. Discusses importance of capacities, beam heights, and dimensions, types of suspensions and controls, speeds and other factors in choosing a hoist. Also discusses five points to consider in buying a new electric wire rope heavy-duty hoist. Materials Handling Div., American Engineering Co.

103 Industrial Cranes—Bulletin CR-610, 32 pp, contains detailed information on company's line of industrial cranes, including hoist gears and cases, and crane controls. Includes selection information and specifications, photos and drawings, table of crane operating speeds, and crane clearance tables. Ederer Engineering Co.

104 For Materials Handling—The many types of materials handling equipment manufactured by this company are illustrated and briefly described in this 22-pp loose-leaf catalog. Covers automatic and motorized tongs for lifting material of any shape, weight, or size, as well as sheet lifters, rack lifters, motorized rotating hooks, and other hooks. Applications are illustrated and engineering data included. Heppenstall Co.

CONSTRUCTION

105 Pre-Engineered Buildings—Catalog No. BD-1257, 18 pp, describes advantages of pre-engineered metal buildings for a variety of applications ranging from tool sheds to complete manufacturing plants. Features photos and detailed specifications. The Parkersburg Rig and Reel Co., Div. of Parkersburg-Aetna Corp.

106 Estimating Guide—This estimating guide outlines uses and costs for 37 "building saver" products. Covers products for treatments of concrete floors and wood floors, as well as admixtures for concrete and mortar, and waterproofing and dampproofing compounds. Covers use, quantities required, methods of application, and costs. L. Sonneborn Sons, Inc.

107 Building Panels, Panes—Form SL-3, 8 pp, presents Structoglas A reinforced plastic corrugated building panels and flat panes, giving information on product's mechanical and physical properties, chemical resistance, colors and finishes. Installation instructions cover sidewall mounting, roof construction. Skylight construction and continuous windows are shown. A technical data table gives thicknesses, standard lengths, finishes, coverage, lappage and spans for 100-lb loads. Structoglas Div., International Molded Plastics, Inc.

108 Roofing and Siding—Three configurations in aluminum roofing and siding materials—V-beam roofing and siding, and two siding sheets with box-rib configurations of four and eight inches pitch—are described in this 16-pp brochure. Gives details on these along with data on a line of industrial covering materials, flashing. Kaiser Aluminum & Chemical Sales, Inc.

109 Daylighting Products—Bulletin 572, 24 pp, contains general information, specifications, architectural and engineering details, suggested applications, and other information on Fiberglas-reinforced plastic daylighting products. Included are details on standard plastic panels, Fire-Snuf structural plastic panels, Consolite double-dome insulating plastic skylights, and company's other specialty plastic products. Resolite Corp.

110 Overhead Doors—Sixteen-pp Catalog F 4644-9 presents industrial and other overhead doors. Gives information on Weather-King flush overhead door sections, combining sandwich construction with weatherproof facing. Door panels, electric operators, cam-action closing hardware, radio and special controls are also described. Specifications and instructions for preparing building openings and installation are given. Barber-Colman Co.

MAINTENANCE

111 Maintenance Equipment—This 49-pp illustrated booklet describes in detail company's various maintenance products. Among the equipment covered are "offset" machines, vacuum cleaners, triple-power vacuum cleaner with by-pass motor for greater cleaning efficiency and silent operation, vacuum cleaners for handling of dry cleaning applications, double suction cleaner for furnace and boiler flue cleaning, boiler flue cleaning tools. Also shown are vacuum cleaner attachments, such as hoses, floor handles and extensions, carpet and bare floor tools, brushes, hand tools, and miscellaneous tools and connectors. The Kent Co., Inc.

112 Protective Coatings—This 36-pp protective coatings manual, Form 257, is a comprehensive treatise featuring actual color chips of 102 coating items. Includes complete sections devoted to methods of surface preparation, use of primers, and finish coatings, and the availability of special custom coatings where required. Covers primers, short oil type coatings, long oil type coatings, restful color group, oil field finishes, heat resistant and chemical resistant coatings, Galvinoleum coatings, floor coatings, other products. Rust-Oleum Corp.

113 Trowel Coatings—Regular, extra-resistant and floor surfacing grades of these trowel coatings for corrosion and abrasion proofing are described in this brochure. Advantages are detailed and application data and photos included. Pennsalt Chemicals Corp.

114 Pyramid Ladders—Catalog 158, 20 pp, describes a line of pyramid-design step ladders, as well as hydraulic lifts and fixed or adjustable-level work platforms for above-floor working safety. Illustrates 35 new models of ladders for working heights up to 15 ft, gives detailed specifications and shows typical uses. Ballymore Co.

MECHANICAL POWER TRANSMISSION

116 Power Transmission Equipment—Bulletin 7900-B1P, 12 pp, is designed as a general catalog on mechanical power transmission equipment. Contains selection charts for heavy duty QD sheaves, light weight and QD Junior sheaves, V-belts, and variable speed drives, including allspeed drives, motor drives, and motor pulleys. Worthington Corp.

117 Multiple Drive Systems—Advantages of company's multiple drive system which provides simultaneous speed changes are detailed in Form F-1910. Examples of basic applications are included as well as photos of typical installations. U. S. Electrical Motors Inc.

118 Any-Speed Drives—Advantages of company's fluid power "any-speed" drives are illustrated and described in 32-pp Bulletin 10600. Contains numerous performance curves representing operating characteristics of the drives, as well as pictorial diagrams of component features. Typical jobs handled are also detailed. The Oilgear Co.

Reader Service Cards for ordering bulletins are on pages 217-218. Be sure to include your name, job title, and company, even if you want bulletins mailed to your home address.

119 Belt Drives—Application range of company's Timing belt drives for power transmission, synchronization and for functional applications is described in 68-pp Catalog TB-58. Contains information on all five basic belt pitches, as well as complete engineering data, selection, installation and use of these positive, lubrication-free drives. Morse Chain Co.

120 Speed Reducers, Gears—This 180-pp catalog covers company's line of speed reducers, custom gears and commercial gears. Complete details are given on sizes, ranges, capacities and types available. Also provided are illustrations, schematic drawings and specifications. The speed reducer sec-

BULLETINS

(Begins on page 21)

tion covers eight basic types of reducers that are available in worm and gear, single and double reductions, and helical and mitre gear with reduction ratios up to 3660 to 1. Other sections are devoted to custom gears and the standard commercial gears. Grant Gear Works, Inc.

121 Transmission Belting—This 20-pp catalog describes in detail the Swedish Trelleborg V-belts and endless flat cord belts. Generously illustrated, gives information on design and construction of the belts and tells how to select, install and maintain them. Dimensional data provided, and installations shown. Homestrand, Inc.

122 Roller Chain Attachments—Eight-pp Bulletin 507 includes complete pricing information on standard attachments for standard and double pitch roller chains. These attachments and some suggestions as to how they can be used are illustrated. Diamond Chain Co., Inc.

123 Heavy Duty V-Belt—This illustrated bulletin describes Condor LS V-belt for long center, heavy duty drives and featuring a precision proportioned construction reported to eliminate V-belt whip and turn-over that leads to belt failure. Advantages of design and construction are detailed. Manhattan Rubber Div., Raybestos-Manhattan, Inc.

124 Bearing Units—Catalog Bu-101-A, 12 pp, illustrates and describes company's line of bearing units, consisting of pillow blocks and flange blocks. Advantages are detailed and comparison charts, specifications and dimensional diagrams are included. Browning Mfg. Co.

FANS, VENTILATING

125 Ventilating Fans—Bulletin UVS-104, 28 pp, describes belt-driven ventilating units with either forward curve wheels or backward blade non-overloading wheels. Also includes complete performance tables, engineering data, selection and installation information and full specifications on 12 basic size package fans. General Blower Co.

126 Heat Fans—Bulletin HF 100, 20 pp, describes features and construction components of high temperature heat fans. Performance and selection data is furnished in tabulated form, and example and explanation of engineering calculations involved in selection of heat fans is included. General Blower Co.

127 Guide to Grilles—Catalog 1-58 is a 54-pp selection manual on air diffusion equipment. Describes company's line of grilles and registers, including new airline grilles and registers, curved louvres and grilles and louvres pivoted at the front. Provides photos, drawings and selection tables for each of the 26 standard sizes and for the new grilles. Waterloo Register Co., Inc.

PUMPS, COMPRESSORS

128 Pump Selector—Bulletin 158 briefly describes company's many types of pumps, all designed for abusive applications, such as those involving corrosion, abrasion, high temperature or a combination of them. Photos are included along with descriptions of design and operating features and applications. Nagle Pumps, Inc.

129 High Pressure Pump—Technical Bulletin 252 features high pressure screw pumps for various oil services at discharge pressures to 1000 psig and viscosities from 35 to 75,000 SSU. Selection nomographs, outline dimensions, sectional view and details of design and construction are provided. Warren Pumps, Inc.

130 Mixed Flow Pumps—Low- and high-head mixed flow volute pumps for sewage disposal, drainage, flood control, irrigation, raw water pumping, or for any relatively clear liquids are described in 6-pp Catalog F-102. Design and construction details for horizontal and vertical mixed flow volute pumps are presented. C. H. Wheeler Mfg. Co.

131 On Glassed Pumps—"It's What's Inside that Counts" is a 16-pp booklet on glassed centrifugal pumps. Includes brief history of the development of this pump and answers to over 30 frequently asked questions about it. These cover corrosion resistance offered, mechanical design and application. Goulds Pumps, Inc.

132 Boiler Feed Pumps—Eight-pp Bulletin 65 discusses relative merits of centrifugal and turbine regenerative type boiler feed pumps. Design features and advantages of company's turbine boiler feed pumps are detailed and illustrated. Table of pump characteristics is included, as well as performance table and other data. Fred H. Schaub Engineering Co.

133 Multi-Stage Compressors—Bulletin 150, 64 pp, presents company's multi-stage centrifugal compressors in both horizontally-split and vertically-split types. Advantages, construction features and application of each type are covered, and text is illustrated with photos and cutaways. A section of general information discusses fundamentals of centrifugal compressors and drivers for them. Also included are engineering data and performance characteristics. Clark Bros. Co.

HEATING

134 Instantaneous Heaters—Bulletin IW-34, 8 pp, features indirect type instantaneous water heaters, their application, selection and installation. Covers advantages of indirect water heating, methods of determining available boiler capacity, estimating hot water demand, and includes example problems, typical heater installations, selection tables. Bell & Gossett Co.

135 Cabinet Heaters—Sixteen-pp Bulletin 9617 describes company's redesigned line of cabinet heaters and their features of construction. A pictorial reference guide shows 43 possible mounting arrangements. Tables of steam capacities for 14 models and of hot water capacities for 21 models included. Also provided are Btu correction factors for hot water and steam, cfm conversion factors, other data. Schematic drawings illustrate four piping installations. American Blower Div., American-Standard.

ELECTRICAL

136 Shaded Pole Motors—Bulletin GEA-6134B is a 12-pp publication containing design, dimension, rating, performance, and application data on shaded pole motors for such applications as window, ventilator and condenser fans, unit heaters, small direct-drive furnace heaters, dehumidifiers, and evaporative coolers. Cutaway views show component features and tables give ratings, dimensions and other data. General Electric Co.

137 For Synchronous Performance—Bulletin 1900, 8 pp, describes the Syncro-Speed, a synchronous induction motor built in same NEMA frame size as a standard one of equal horsepower. Uses illustrated include high frequency drives, precise timing, metering and recording devices, constant speed conveyor drives. Graphs and illustrations show design principles. The Louis Allis Co.

138 Weather-Protected Motors—Weather-protected motors with enclosures built to NEMA Type II standards to meet every requirement of outdoor service are described in Bulletin 05B7874C. Gives data on construction and mechanical features and includes a cutaway view showing these features. Allis-Chalmers Mfg. Co.

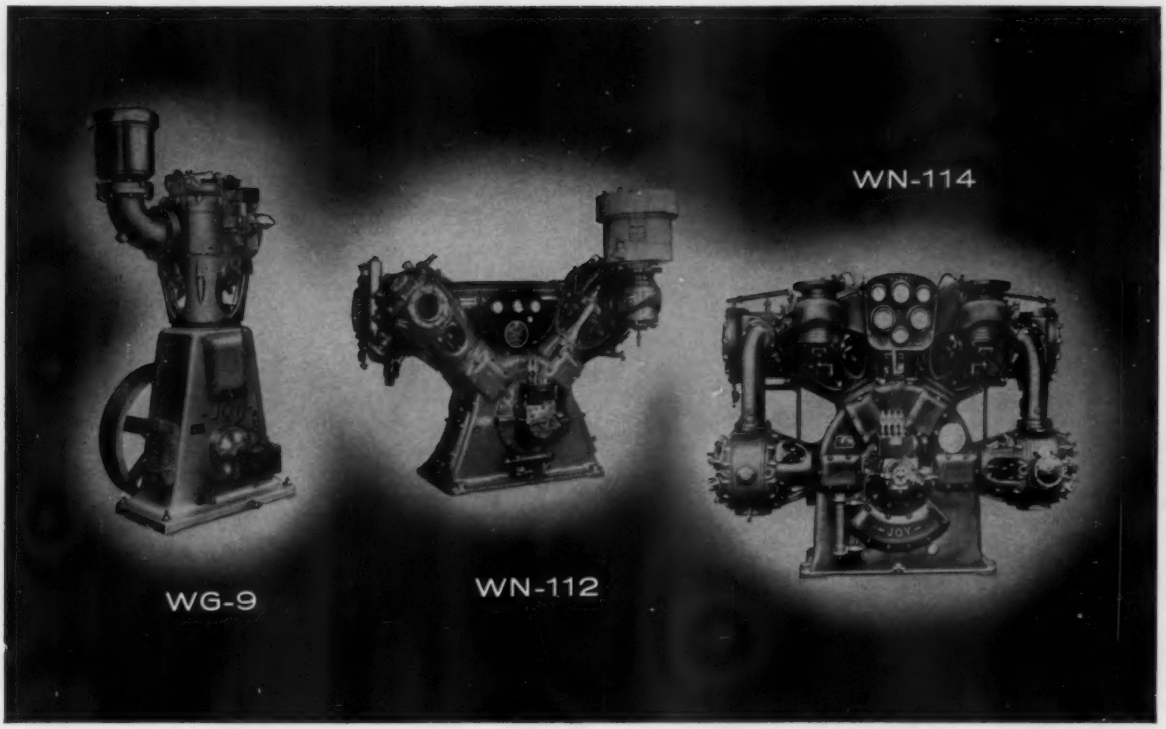
On pages 217-218 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

139 Special D-C Motors—Bulletin GED-3343, 8 pp, tells how company is equipped to solve special d-c motor application problems. Outlines complete engineering service, modern manufacturing facilities, and an actual case history. General Electric Co.

140 Comparative Motor Sizes—This Compar-A-Frame, Bulletin B-1284-1, gives NEMA frame assignments and overall dimensions of protected and fan-cooled a-c motors. Punched for easy insertion in notebooks, the bulletin explains how to compare dimensions of Series C motors with those of the Series D line (new NEMA frame sizes). Reliance Electric and Engineering Co.

141 Pump Motors—Totally protected pump motors, from ⅛ to 1,000 hp, are described in Bulletin B-2507. Photos and easy-to-read copy explain component features and design and construction advantages. Reliance Electric and Engineering Co.

(More Bulletins on page 219)



NEED TO *Expand* YOUR COMPRESSED AIR FACILITIES?

WRITE FOR THESE FREE BULLETINS ON JOY COMPRESSORS

JOY WG-9 • 15 to 75 Horsepower • 95.6 to 939 CFM

Single cylinder, single stage, double acting, water cooled. Joy vertical design saves space . . . fits right into plant expansion plans. Fourteen models. Bulletin shows cross-section diagram with construction and operation details.

JOY WN-112 • 60 to 150 Horsepower • 368 to 974 CFM

Two cylinder, two stage, double acting, water cooled. Joy pioneered the V-vertical design in 1936 . . . thousands of these units in operation. Nine models available. Bulletin gives complete details on construction and operation.

JOY WN-114 • 175 to 600 Horsepower • 1186 to 3896 CFM

Four cylinders, two stage, double acting, water cooled. Joy semi-radial design provides maximum capacity in very little space. Eight models. Bulletin gives complete construction details.

JOY MANUFACTURING COMPANY, OLIVER BLDG., PITTSBURGH, PA.

EQUIPMENT FOR INDUSTRIAL PLANTS... FOR ALL INDUSTRY

WRITE FOR BULLETIN SET 156-15

AIR & GAS COMPRESSORS

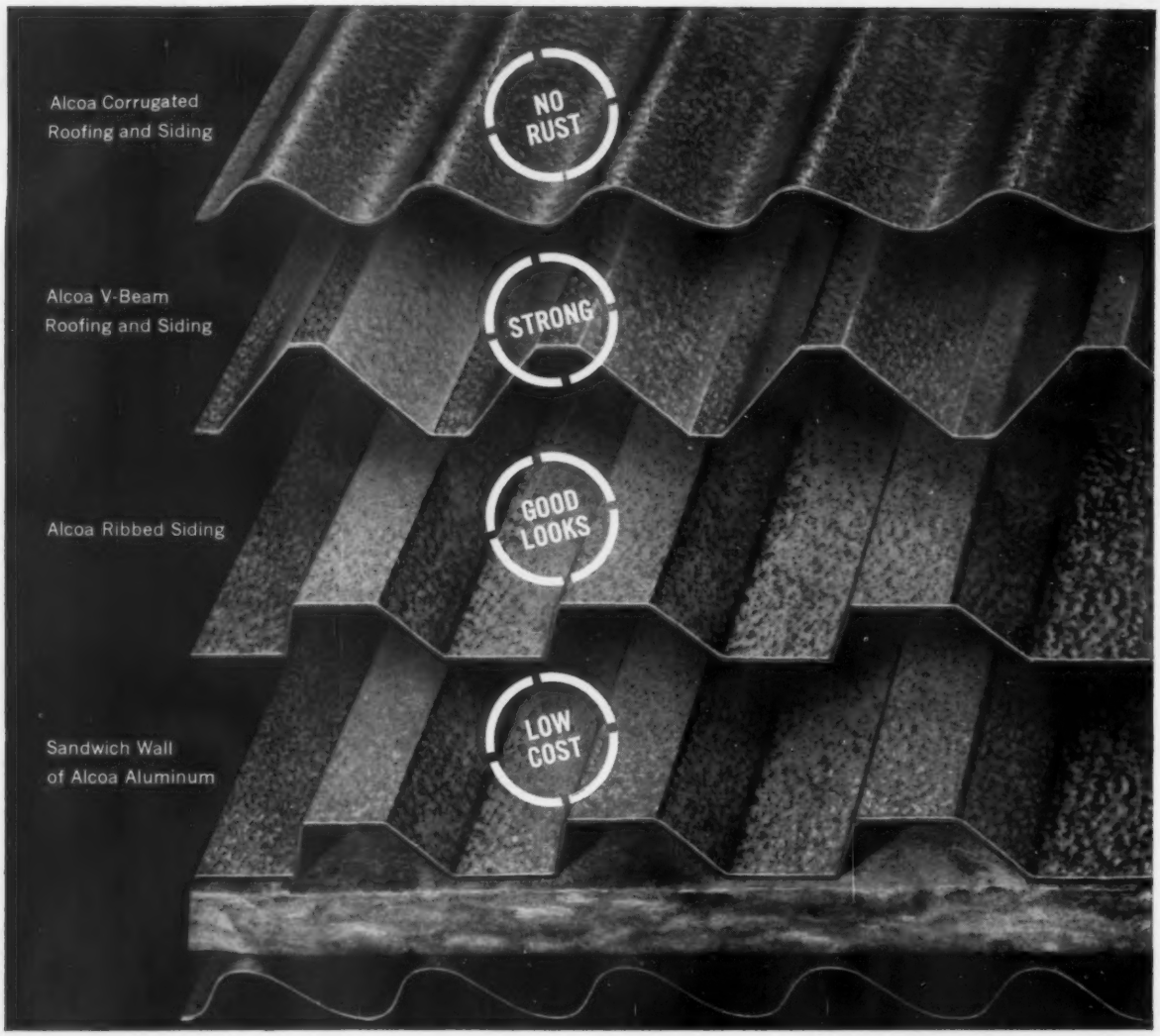
FANS AND BLOWERS

ELECTRICAL CONNECTORS

OIL FREE COMPRESSORS

WSW 16471-186

For more facts circle 515 on Reply Card



FOUR REASONS WHY

PLANT CONSTRUCTION IS GOING ALUMINUM

Save construction money now and maintenance costs later with these Alcoa® Aluminum Industrial Building Products and Materials . . . for both new plants and plant expansion:

1. Humid atmospheres and industrial fumes mean nothing to Alcoa Corrugated Roofing and Siding. Once up, that's it! No painting or expensive maintenance of any kind ever needed.

2. Aluminum-clad buildings can be *strong buildings* with Alcoa V-Beam Roofing and Siding. Safely carries 30 lb/-sq-ft uniform load on a 10-ft purlin spacing.

3. Aluminum-clad buildings can be *good-looking buildings* with Alcoa Ribbed Siding. This configuration makes buildings clean-lined with good vertical shadows.

4. Sandwich wall of Alcoa Aluminum is the lowest cost insulated metal wall system known: With a "U" value of .155, it has three times the insulating value of 8-in. brick. Goes up fast, too. Permits economical air conditioning.

All of these materials offer the benefits inherent in aluminum—corrosion resistance, low cost and good looks. They are sold and erected by Alcoa Approved Applicators. For the name of the Applicator near you, contact your Alcoa sales office, or write: Aluminum Company of America, 858-D Alcoa Building, Pittsburgh 19, Pennsylvania.

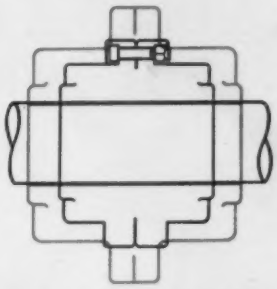
ALCOA ALUMINUM
INDUSTRIAL BUILDING PRODUCTS
ALUMINUM COMPANY OF AMERICA

Your Guide to the Best in Aluminum Value

"ALCOA THEATRE"
Exciting Adventure
Alternate Monday Evenings

For more facts circle 516 on Reply Card

Compactness - -
it's the big difference in geared flexible couplings



Link-Belt geared couplings (black) are smaller, lighter, yet highly capable—provide dependable performance plus savings in space and cost.

These features assure coupling reliability:

1. **SOCKET HEAD FLANGE BOLTS** of hardened steel with ground body securely join housing halves. Locknuts prevent loosening in operation.
2. **FIBER GASKET** fits tightly between flanges. Lubricant can't escape.
3. **PRECISION-CUT** gear teeth have controlled clearance to allow for normal misalignment—minimum backlash.
4. **ALL-STEEL CONSTRUCTION** with properly proportioned parts assures sturdiness, long life operation.
5. **QUAD-RING SEALS** are exceptionally effective in retaining the lubricant. Gearing is always submerged in oil, assuring long, trouble-free operation.

That's why LINK-BELT geared flexible couplings transmit more hp per coupling dollar

COMPACTNESS and high load capacity make Link-Belt geared flexible couplings your best answer for economical power transmission. Size for size, they will accommodate larger, more powerful shafts than other flexible couplings.

These couplings are all-steel and accurately machined for dependability and long life. Hardened flange bolts are ground for close fit. Socket type bolt heads require less of the coupling diameter to be used in the flange—more is available for larger gears and larger shafts.

Compact and rugged—these couplings offer exceptional durability to cope with shock, pulsation, reversing loads and misalignment. For facts, contact your Link-Belt office or authorized stock-carrying distributor. Or write for Folder 2775.

For more facts circle 517 on Reply Card

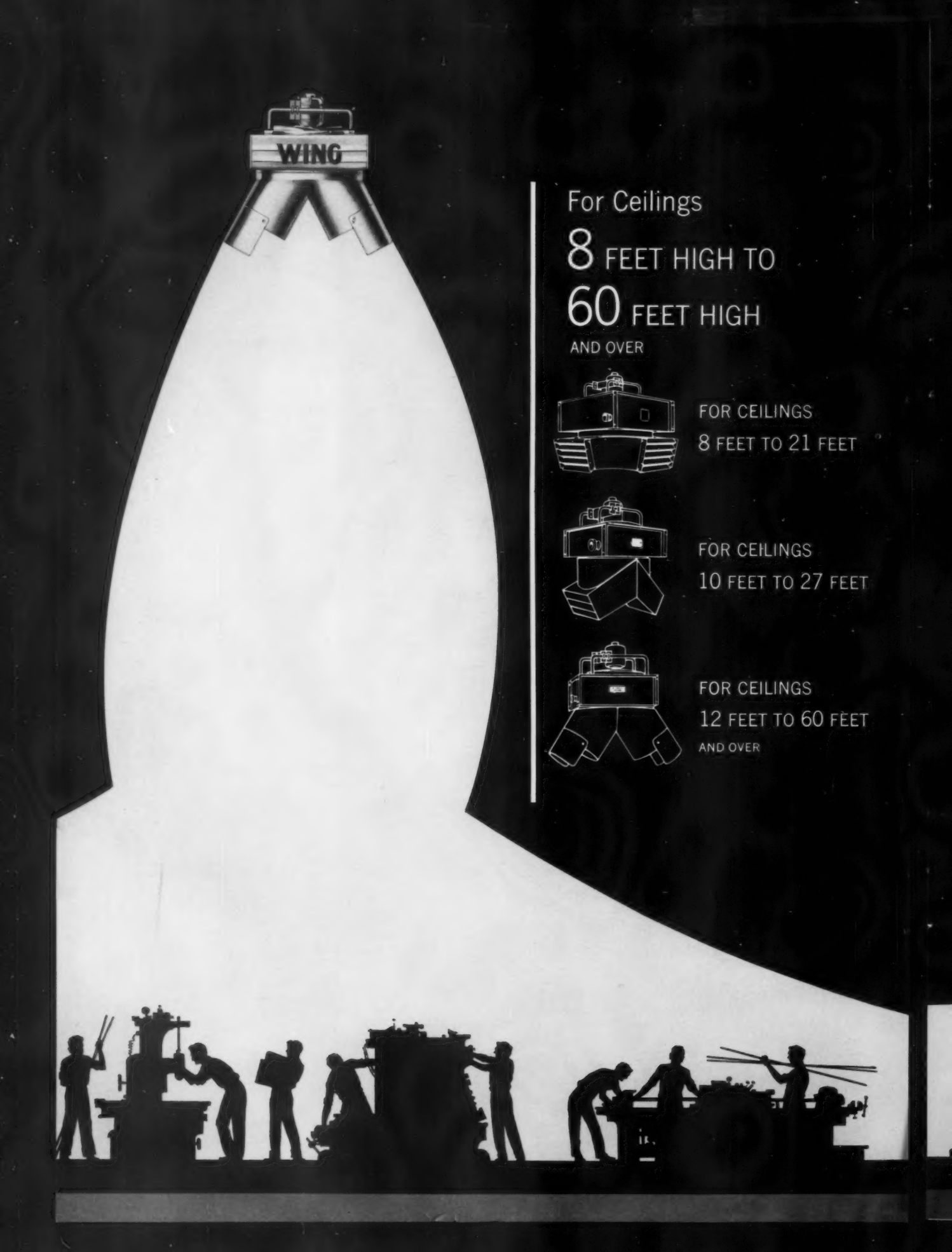
LINK-BELT

GEARED FLEXIBLE COUPLINGS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World.

14,485

For more facts circle 518 on Reply Card →


WING
For Ceilings
8 FEET HIGH TO
60 FEET HIGH
AND OVER
FOR CEILINGS
8 FEET TO 21 FEET
FOR CEILINGS
10 FEET TO 27 FEET
FOR CEILINGS
12 FEET TO 60 FEET
AND OVER

ONLY

Wing

REVOLVING HEATERS

offer all these advantages

Hot Blasts and Cold Spots Eliminated In Wing Revolving Unit Heaters, the warm air outlet rotates slowly and continuously. This movement of the revolving outlet sets up a gentle air motion which distributes the heat evenly, and eliminates those hot and cold spots caused by stationary heaters.

Because of the constantly changing direction of the warm air, it finds its way around obstructions, such as machinery in manufacturing plants, cars and buses in repair garages, airplanes in hangars, etc.

Fewer Wing Heaters Needed The old concept of unit heaters spaced every 60 or 80 feet doesn't apply with Wing. Wing's largest Revolving Heater, for example, covers over 125′ x 125′.

In a large building this means fewer heaters, much lower installation and maintenance costs. In a building 125′ x 420′, for instance, 4 Wing Revolving Heaters do the job of 12 stationary heaters–without uncomfortable hot blasts or cold spots.

60 Foot Ceilings, And Higher Many thousands of high ceiling Wing Revolving Heaters have been installed where efficiency and comfortable heat are paramount.

Equally Effective with Low Ceilings Wing's line of adjustable discharge outlets provides efficient heating regardless of ceiling height–from 8 feet up.

Low Outlet Temperature Because of Wing's exclusive heating section design, low pressure heating comfort can be obtained with any steam pressure up to 200 psi.

For complete detailed information on Wing's line of Revolving Unit Heaters contact your local Wing Representative or write our Main Office in Linden, N. J.

L. J. Wing Mfg. Co.

DIVISION OF AERO SUPPLY MFG. CO. INC.

140 VREELAND MILLS ROAD, LINDEN, NEW JERSEY

FACTORIES: LINDEN, N. J. AND MONTREAL, CANADA

IN EUROPE: WANSON, HAREN-NORD, BRUSSELS, BELGIUM

OTHER WING PRODUCTS:

- Fresh Air Supply Heaters
- Draft Inducers • Fans
- Turbine and Motor Blowers
- Auxiliary Turbines

WC101

WRIGHT Electric Hoists

NEW ELECTRIC CHAIN HOIST

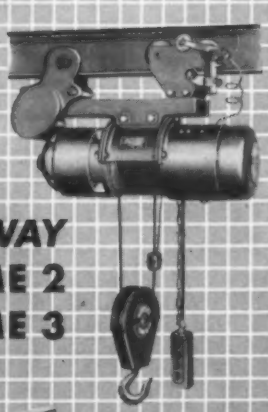
The new WRIGHT Electric Chain Hoist is available in two size capacities: 300 to 2000 lbs. (single chain) and 3000 to 4000 lbs. (double chain). It is safe, easy to operate, rugged and durable. It is exceptionally valuable for use on production lines, over machine tools or any shop location where space is at a premium.

2-SPEED *SPEEDWAY* FRAME 1

WRIGHT now offers a *Speedway* Two-Speed Hoist in the Frame 1 size. It permits precise, gentle positioning of production work in capacities from ¼ ton to 1 ton. This hoist gives a fast lifting and lowering speed —and a slow speed (¼ the rate of the fast speed) by the use of 1800/450 RPM motors.

SPEEDWAY FRAME 1½

WRIGHT *Speedway* Electric Hoists are built to meet the many and varied demands of modern high-speed production. Many design improvements minimize maintenance costs and down-time. The Frame 1½ Hoist will handle loads of from 1½ to 2 tons. The Type L-1½ shown is 4-part reeved and intended for relatively slow lifting speeds.



SPEEDWAY FRAME 2 FRAME 3

WRIGHT Frame 2 *Speedway* Electric Hoists are capable of handling loads from 1½ to 6 tons. The Frame 3—from 1½ to 10 tons. WRIGHT *Speedway* Hoists are available with single or variable speeds and with a wide variety of mounting arrangements to meet specific requirements.

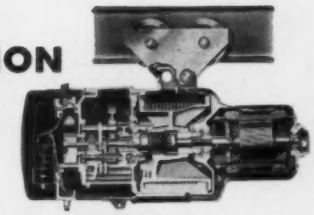
FOR COMPLETE INFORMATION

Ask for the following booklets for complete information on WRIGHT Hoists and Crane components: Speedway Hoists (Frame 1-1½) Booklet DH-133B, (Frame 2 and 3) Catalog E-55B • Motor Driven Cranes—Underhung, Single Bridge—Bulletin #227; Top Running Cranes—Bulletin DH-448 or DH-449 • Crane Drive Units—Booklet DH-431A • Hand Traveling Cranes—Bulletins DH-468 and DH-348B.

for Lowest Final Cost

These features make WRIGHT Speedway Hoists your best buy for—

MORE PRODUCTION

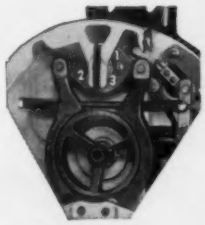


Fine balance and heavy duty design make possible the continuous handling of tough jobs on any duty cycle for which a 30-minute NEMA motor is satisfactory. All gears and pinions are alloy steel, heat-treated. Their ductile core supplies shock resistance to most severe service stresses. Anti-friction bearings throughout.

LONGER LIFE

Strength of gear teeth of WRIGHT Frame 2 and 3 Speedway hoists has been doubled by a change in contour and grain structure of the metal. Internal gear ring with heavy flanged cross section is bolted to drum at six points and provides extreme resistance to distortion.

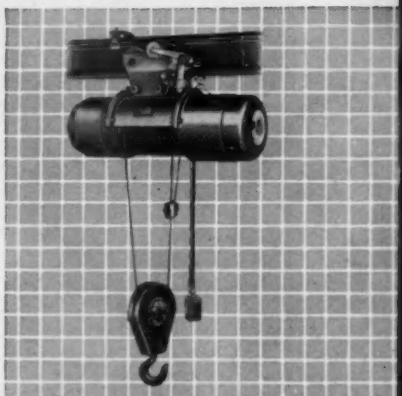
EASIER MAINTENANCE



There is nothing to adjust but the cam to keep brake in perfect adjustment. When excessive load drift occurs... remove the screw shown at Position 1, swing the cam until Position 2 is in line. Replace the screw. Position 3 is provided for the final third of brake lining wear. Brake springs and solenoid never need adjustment.

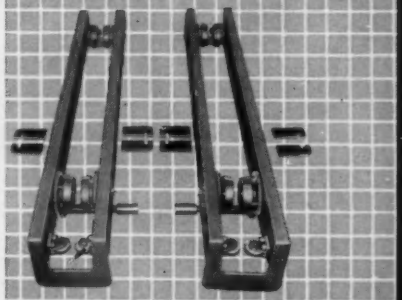
Better performance at lower cost by using WRIGHT units for local-built cranes

SPEEDWAY ELECTRIC HOIST



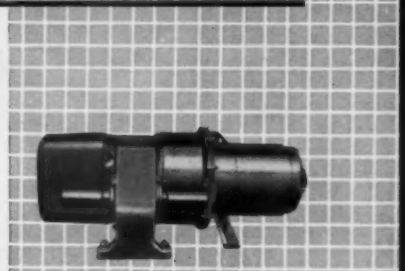
Available in Frame 1, 1½, 2 and 3 sizes with capacities from ¼ ton to 10 tons.

END TRUCKS



For motor-driven cranes and hand traveling cranes—both top running and under-hung types. Timken bearings throughout. Wide range of capacities.

CRANE DRIVE UNIT



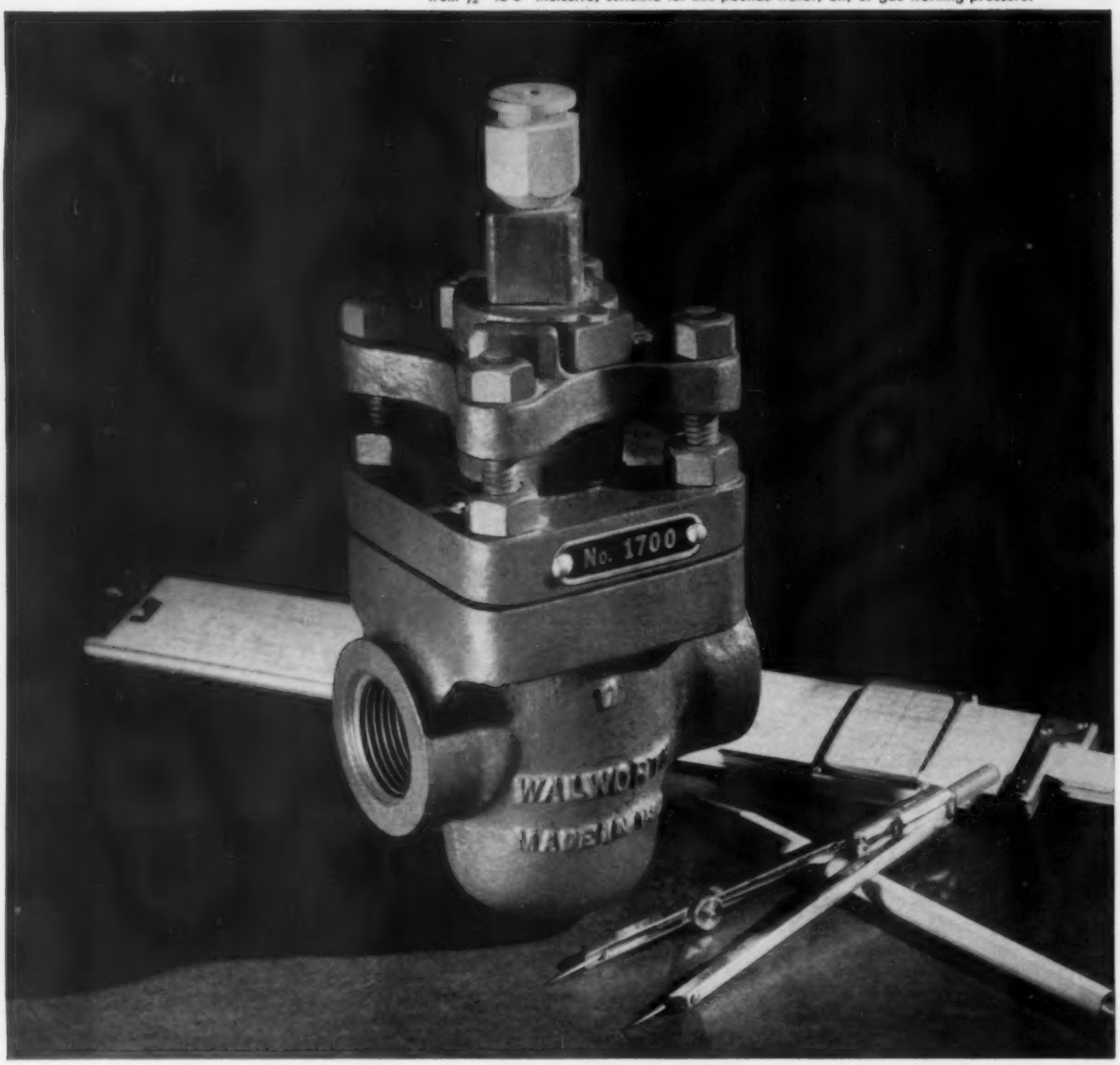
For crane and double-beam trolley propulsion. Electric motor transmits power through fluid drive to well proportioned gear reduction. Units are equipped with WRIGHT designed solenoid "drag" brake. Size 1—with motors to 2 HP. Size 2—with 3 to 7½ HP motors.

Wright Hoist Division
AMERICAN CHAIN & CABLE

ACCO

York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

Illustrated here is the Walworth Lubricated Plug Valve No. 1700, available in sizes from ½" to 5" inclusive, suitable for 200 pounds water, oil, or gas working pressure.



problem-solvers for tough jobs

*LPV's by WALWORTH

If you're familiar with the basic advantages of Plug Valves, you know why Walworth Lubricated Plug Valves work so well in really tough spots. You know about their direct port opening . . . their dead tight shut off. Seating and sealing surfaces are fully protected from attack by fluids being handled by insoluble lubricants.

*Lubricated Plug Valves

Remember, you can get Walworth LPV's in all sizes . . . from ½ to 30 inches . . . for pressures up to 5000 psi and for vacuum service . . . in a number of different styles and patterns. For more information about LPV's and for your copy of the new Walworth LPV Circular, see your local Walworth Distributor.

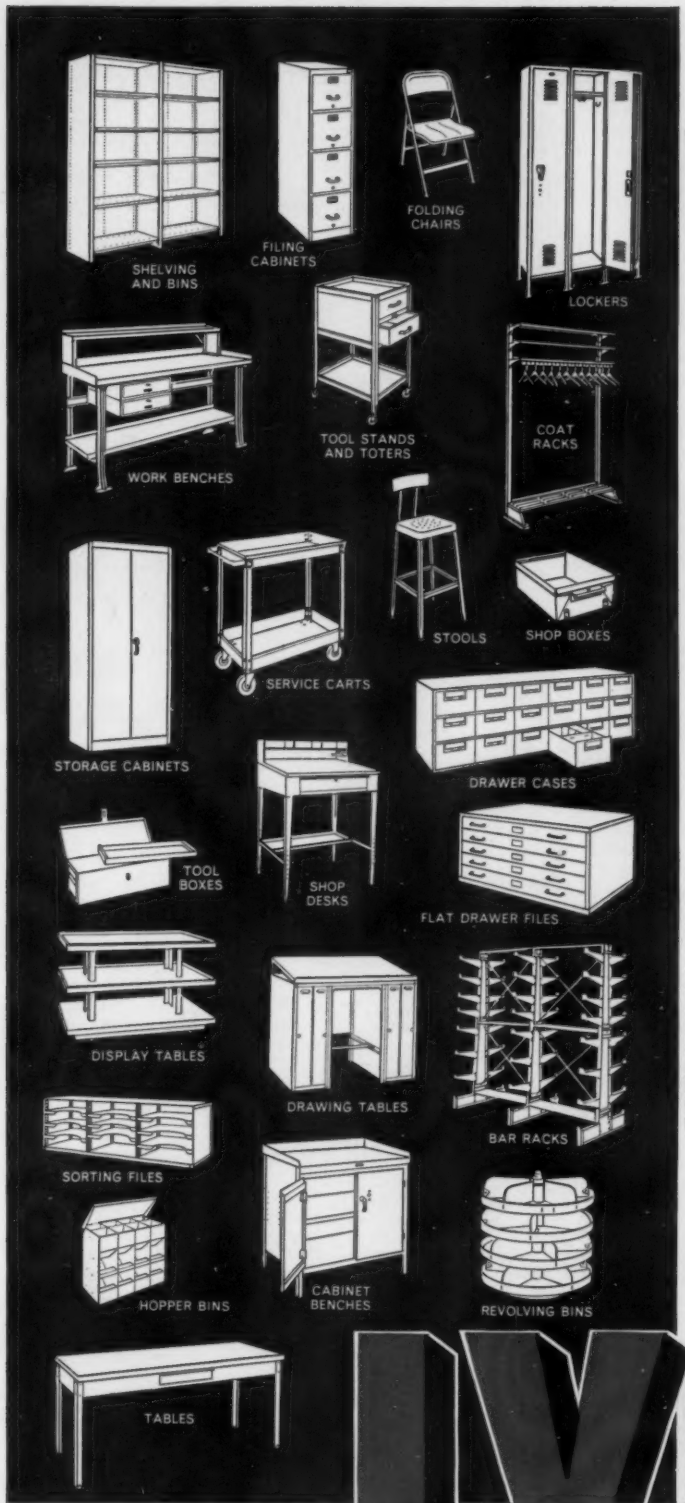
WALWORTH

750 THIRD AVENUE, NEW YORK 17, N. Y.
DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

WALWORTH SUBSIDIARIES: ALLOY STEEL PRODUCTS CO. • CONOFLOW CORPORATION • GROVE VALVE AND REGULATOR CO. SOUTHWEST FABRICATING & WELDING CO., INC. • M&H VALVE & FITTINGS CO. • WALWORTH COMPANY OF CANADA, LTD.

For more facts circle 520 on Reply Card

← **For more facts circle 519 on Reply Card**



OVER 1500 ITEMS
for Business, Industry, Institutions

We'd like to send you a FREE copy

A BUYING GUIDE
that will help you get the most for your steel equipment dollars

• New 84-page catalog illustrates and describes LYON's diversified line of steel equipment . . . over 1500 items for Business, Industry and Institutions. There's a Lyon dealer as near as your telephone.

LYON METAL PRODUCTS, INC.
491 Monroe Ave., Aurora, Ill.

Please send me a copy of Catalog No. 100

NAME_____

FIRM_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

LYON METAL PRODUCTS, INC.
General Offices: 491 Monroe Ave., Aurora, Ill.
Factories in Aurora, Ill., and York, Pa.
Dealers and Branches in All Principal Cities

Lyon also has complete facilities for manufacturing special items to your specifications

LYON®
STEEL EQUIPMENT

For more facts circle 521 on Reply Card

"THIS LUBRICANT CUT OUR LUBRICATION COSTS IN HALF"

says-PHILADELPHIA QUILTING CO.

"Trouble from conventional greases floating off hot shafts of our quilting machines caused us to try a LUBRIPLATE Lubricant. It proved so satisfactory that we are now using it as an 'all-purpose' grease throughout our plant. We feel that LUBRIPLATE is saving us 50% in lubrication costs."

W. Szczepanski,
Chief Maintenance Engineer

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE GREASE AND FLUID TYPE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

LUBRIPLATE is available in grease and fluid densities for every purpose . . . LUBRIPLATE H. D. S. MOTOR OIL meets today's exacting requirements for gasoline and diesel engines.

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Send for free "LUBRIPLATE DATA BOOK" . . . a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

For more facts circle 522 on Reply Card

BACKTALK AND FORETHOUGHTS

Edited by Marjorie E. Weissman

Portable Grinder Safety

PLANT ENGINEERING:

"As president of the Compressed Air and Gas Institute, I would be very much interested in receiving a reprint or tear sheet of the article 'Safety Checks for Portable Grinders,' which appeared in the November, 1957, issue of your magazine." *H. O. Grummere, Executive Vice President, Buckeye Tools Corp., Dayton, Ohio.*

Question on Scrap Article . . .

PLANT ENGINEERING:

"The article describing the scrap program at Western Electric Company, appearing on page 106 of the February issue, was of interest to us since we are in the metal fabricating business.

"We are mainly concerned with the hoppers which were described in this article. Would you supply us with the name of the manufacturer of this equipment, so that we may get more information?" *Otto J. Seidl, Plant Engineer, Combustion Engineering, Inc., East Chicago, Indiana.*

The Answer . . .

PLANT ENGINEERING:

"We were impressed with your February article on the scrap handling techniques used at the Indianapolis plant of Western Electric Company.

"Your very thorough description of the operation indicates that Western Electric has found a very efficient way of solving a problem that is common to a good many manufacturing plants.

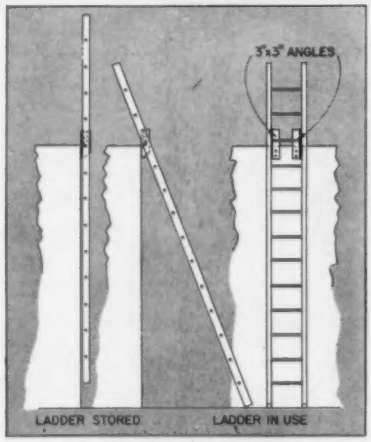
"We are particularly happy to see this because we supplied Western Electric with the hoppers which, as you described, are such an integral part of the waste handling procedure." *L. E. Quinn, Roura Iron Works, Inc., Detroit, Michigan.*

Safe, Portable Ladders

PLANT ENGINEERING:

"Several months ago we recognized an unsafe condition in our plant similar to the one shown on page 144 of the October, 1957 issue of PLANT ENGINEERING. Our solution is somewhat different from Mr. McWilliams', but we had use for our ladder at two locations. "The attached sketch shows our setup. Possibly some of your readers would be interested." *Roy A. Sternaman, Tool Services, Mgr., H. K. Porter Co. (Delaware), Delta Star Electric Div., Chicago, Ill.*

► Our October article showed how Mr. McWilliams, a Shawinigan Water & Power Co. engineer, in Quebec,



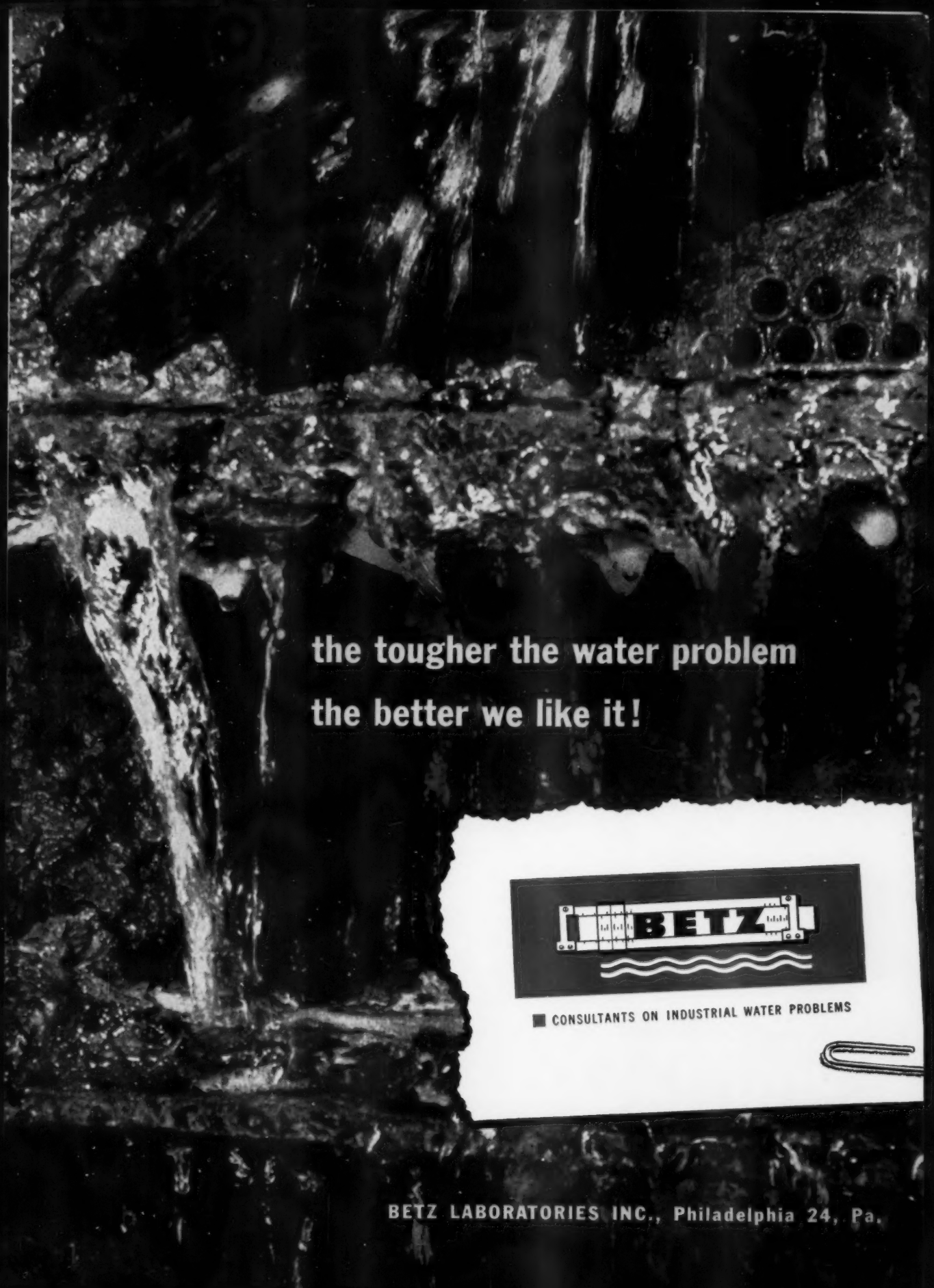
made a ladder safe for climbing to a balcony. Photograph shows how ladder moves freely up and down along channels and hand rails fastened to wall.

Mr. Sternaman's equally excellent idea allows the ladder to be moved about as needed.—*Editors.*

Parking Lots Again

PLANT ENGINEERING:

"Some time ago you published an excellent article on the layout and design of parking lots. Unfortunately, I can't remember when it was published. This problem is becoming more acute as the number of employees driving to work increases and periodic review of parking lot facilities is be-


the tougher the water problem
the better we like it!
BETZ
CONSULTANTS ON INDUSTRIAL WATER PROBLEMS
BETZ LABORATORIES INC., Philadelphia 24, Pa.

EXPANSION JOINTS FOR VOLATILES AND GASES

Flexible metal hose, for leak-proof security, inherent static protection. Specially designed Titepak flange for holding high pressures for interlocked type of tubing. Pressures to 200 PSI. 2" to 24" I.D. in galvanized steel, stainless steel and bronze . . . with asbestos or special packing lined pressure carrier. Write for booklet to Pennsylvania Flexible Metallic Tubing Company, Inc., 7214 Powers Lane, Phila. 42.

GET YOUR COPY

PENFLEX

TIGHT AS A PIPE BUT... FLEXIBLE

For more facts circle 524 on Reply Card

BACKTALK— FORETHOUGHTS

coming a necessity. I would greatly appreciate receiving a copy of this article, as well as any other information on parking lot design, that you may have for distribution." *M. Horwitz Plant Engineer, Chicago Malleable Castings Co., Chicago, Ill.*

▶ We have published several articles on plant parking lots and have sent tear sheets to Mr. Horwitz.—*Editors.*

Profile: American P.E.

PLANT ENGINEERING:

"Many thanks for the advance copy of PLANT ENGINEERING's article on the AIPE Survey. It was well done and I certainly appreciate the publicity that PLANT ENGINEERING is giving to this AIPE activity." *John M. Waligora, Past President AIPE, Chief Engineer, Merck Sharp & Dohme, Div. Merck & Co., Philadelphia, Pa.*

PLANT ENGINEERING:

"I would very much appreciate a copy of your report 'Profile: The American Plant Engineer.' I've been a reader of your magazine for several years and have found it to be very informative and helpful." R. *Lott, Plant Engineer, The Buckeye Cellulose Corp., Foley, Fla.*

PLANT ENGINEERING:

"As a participant in the AIPE Plant Engineers' Survey, I would appreciate receiving from you a copy of the report 'Profile: The American Plant Engineer'." *A. T. Forrest, Assist. Chief Engineer, Crucible Steel Co., of America, Midland, Pa.*

PLANT ENGINEERING:

"Please send me a copy to my home where I can read it in peace." *George S. Winialski, Plant Engineer, Newton-Robertson Bakery, Hartford, Conn.*

PLANT ENGINEERING:

"Please send me one copy of the complete 32-page report, 'Profile: The American Plant Engineer.' I think this report will be of great interest to me." *Charles P. Hung, Time Study Observer, Industrial Engineering Department, Algoma Steel Corp., Ltd., Sault Ste. Marie, Ont., Canada.*

PLANT ENGINEERING:

"May I take this opportunity to express my admiration for the continued excellence of PLANT ENGINEERING. Many magazines, publications and periodicals pass over my desk in the course of a month and I may say the only one I look forward to receiving is PLANT ENGINEERING.

"Since my staff is currently engaged in formulating a preventive maintenance and scheduled repairs program in our plants, I found January's articles relative to this subject of absorbing interest. We originally had an idea that a packaged system purchased complete could be installed with a minimum of charge. How I ruefully agree with Mr. Wombacher's statement that the system must be tailored to suit individual plant needs. Perhaps having 'sweated through' the initial stages of designing and redesigning forms, methods, clashes of personalities iron-bound to the 'old methods' etc., we appreciate our efforts and results much more.

"Would you be kind enough to send me a copy of your report entitled 'Profile: The American Plant Engineer'?" *H. J. Anthony, Plant Engineer, Canadian Bridge, Div. Dominion Steel and Coal Corp., Ltd., Walkerville, Ont., Canada.*

PLANT ENGINEERING:

"Will you please send me a copy of the report, 'Profile: The American Plant Engineer.' I enjoy reading the articles presented in your magazine and have found many of them of great personal interest." *R. J. Williams, Asst. Plant Engineer, Onondaga Pottery Co., Syracuse, N. Y.*

▶ These are but a few of the several hundred letters we received requesting a copy of this booklet which describes the results of a survey conducted by the American Institute of Plant Engineers. Readers who would like a free copy of the survey should write to The Editor, PLANT ENGINEERING, 308 E. James St., Barrington, Ill., on their company letter heads. Please send $1.00 for each additional copy of the report ordered.—*Editors.*

Picture of Dad

PLANT ENGINEERING:

"Would like if possible six tear sheets of the advertisement on page 185 of the December, 1957 issue of PLANT ENGINEERING for our children. Would gladly pay for them." *Mrs. Lorne Evelsizer, Maitland, Fla.*

▶ At first we were a little puzzled by Mrs. Evelsizer's request for copies of the American Bridge advertisement, but after reading it we knew why the children wanted it. The advertisement shows a fine picture of their Dad, who is an American Bridge erecting superintendent. Twelve copies of the advertisement were sent to Mrs. Evelsizer and her family with the compliments of the editorial department.—*Editors.*

Here it is...

BRANDED for lifetime identification

HOW IT'S DONE — The mark is embossed onto, not stamped into, the link. The Make and Grade appear alternately at approximately 10" intervals along the chain opposite the weld and on only one side of the link.

Identification of chain should be ***permanent.*** Colored paint and tape are useful identification marks while chain is moving through distribution channels, but these marks soon disappear after the chain is put to use. That is when identification becomes most important from safety and service standpoints. Permanent marks are the answer. You now get them on CM chain.

Exclusively CM

No other chain offers this valuable feature . . . and you get it at no extra cost

CHAIN BUYERS—Now you can tell at a glance, today or months later, the specific make of chain purchased.

CHAIN USERS—Now you can be sure of the grade (strength) of the chain you are using . . . a definite safety advantage.

DISTRIBUTORS—Now you can positively identify chain sold by you.

PLUS COLOR MARKS

at exact 5 foot intervals for quick identification and fast, *accurate* measuring.

GRADE	Permanent* Mark	COLOR MARK
Proof Coil Chain	PC or P	GREEN
BBB Chain	3B	RED
High Test Chain	HT	BLUE
Herc-Alloy Chain	A	ORANGE

*This permanent branding is presently available on above grades in all sizes under ½".

SPECIFY CM INSWELL FOR THE BEST OF EVERYTHING IN CHAIN

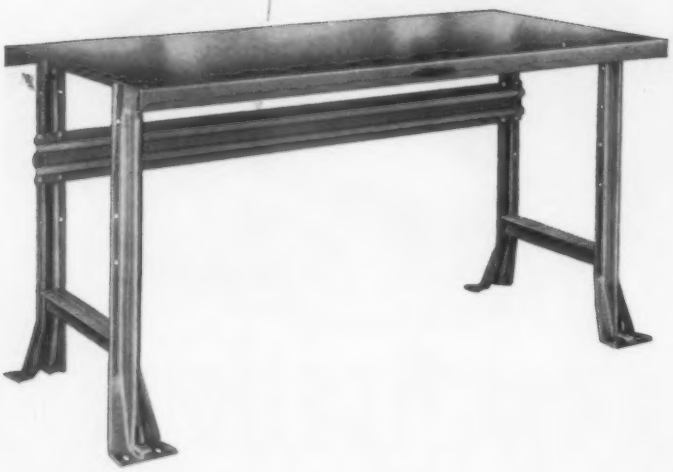
CM HOISTS AND CHAIN

COLUMBUS McKINNON CHAIN CORPORATION
TONAWANDA, NEW YORK
REGIONAL OFFICES: NEW YORK • CHICAGO • CLEVELAND
SAN FRANCISCO • LOS ANGELES
In Canada: McKinnon Columbus Chain Limited, St. Catharines, Ontario

HERC-ALLOY® CM®

For more facts circle 525 on Reply Card

BASIC MODEL



Model 600

One bench top (steel, Presdwood-covered steel, ShopTop or laminated wood), two sturdy steel bench legs, and one bench stringer.

Space Engineering with Standard Units

is a cost-reducing advantage of all HALLOWELL Shop Equipment

Typical installation of HALLOWELL open type work benches. They can be set up in continuous line, back to back or individually as required.

Outfitting plant areas with specially designed and built shop equipment is a costly, time-consuming operation. And the equipment lacks the versatility to meet changing conditions. Space engineering with standard HALLOWELL Shop Equipment overcomes all these disadvantages. Its cost is only a fraction that of custom built units. It is carried in stock by leading shop equipment dealers, is easy to order—and deliveries are excellent. It is extremely versatile. Standard HALLOWELL interchangeable accessories (drawers, drawer tiers, end pieces, backboards, top and lower shelves, utility cabinets, storage wall units and electrical panels) can be added as needed to increase the usefulness of this equipment. Units can be rearranged to meet changing requirements.

Ask the authorized dealer nearest you for complete information on the standard HALLOWELL line of work benches, shop desks, stools and chairs, tool stands, cabinets, storage walls, and shelving. Or write Hallowell Shop Equipment Division, STANDARD PRESSED STEEL CO., Jenkintown 26, Pa.

SPS **Jenkintown • Pennsylvania**

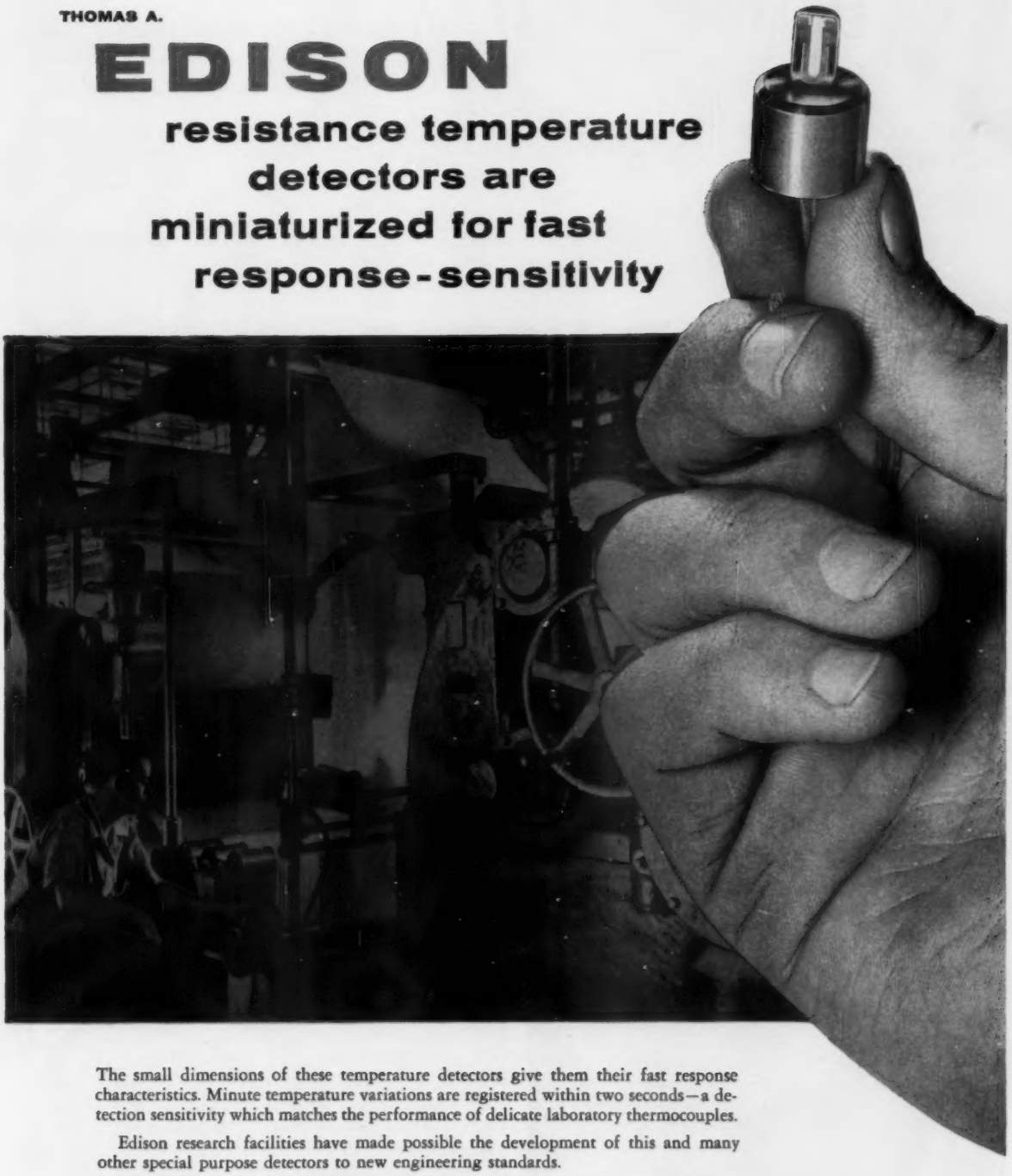
Standard Pressed Steel Co. • The Cleveland Cap Screw Co. • Columbia Steel Equipment Co. • National Machine Products Co. • Nutt-Shel Co. • SPS Western • Standco Canada Ltd. • Unbrako Socket Screw Co., Ltd.

For more facts circle 526 on Reply Card

THOMAS A.

EDISON

resistance temperature detectors are miniaturized for fast response-sensitivity



The small dimensions of these temperature detectors give them their fast response characteristics. Minute temperature variations are registered within two seconds—a detection sensitivity which matches the performance of delicate laboratory thermocouples.

Edison research facilities have made possible the development of this and many other special purpose detectors to new engineering standards.

Designed to measure oil film temperatures, these units have been miniaturized to the point where they can be positioned in direct contact with bearing oil film in a wide variety of applications.

For complete information on Edison Resistance Temperature Detectors, write for Bulletin No. 3016.

Thomas A. Edison Industries
INSTRUMENT DIVISION
88 Lakeside Avenue, West Orange, N. J.

McGRAW EDISON

For more facts circle 527 on Reply Card

PLANT ENGINEERS' DIGEST —so those who rush may read and know what's new

Edited by Marjorie E. Weissman

"Hot" Reactor Cooled Off For Maintenance

REACTOR maintenance, using dry ice and alcohol, has been carried out on an experimental boiling water reactor at Argonne National Laboratory by a group of Laboratory engineers.

The operation involved freezing water in the lower portion of one of the nine control rod "thimbles" or six-foot long pipes leading into the control rod drive mechanism that controls the rate of reaction.

A seal mechanism at the outlet of each control rod thimble, attached to the bottom of the pressure vessel through which control rods are operated, seals water in the reactor during operation.

A back seating plug, similar to a valve, is installed directly above the seal to make servicing possible. In normal maintenance, provision is made to remove the control rod mechanism by dropping the rods until the back seating plugs close at the seal points.

On one occasion when the Laboratory group wanted to remove and clean the seal and hydraulic absorber on one of the thimbles, the back seating plug would not close. This meant that the removal of the mechanism would cause leakage of radioactive water from the core.

By providing an ice dam above the back seating plug, the group theorized that maintenance could be accomplished. There was a four-inch area of pipe between a flange and a steel retainer plate to work on. A two-inch deep mixture of dry ice and alcohol in a small pan, at a temperature of –70F, was applied for five hours. The flange was removed to show 10 in. of ice in the lower portion of the thimble, sufficient for protective shielding.

(Continued on page 40)

Neoprene Balloon Holds Back the Tides While Piping Modifications Are Made

PLANT HAPGOOD, operated by the South Carolina Electric and Gas Co., uses tidewater for its condensers. To provide a positive head on the suction side of the circulating pumps, the intake and lower portion of the discharge piping are located below tide levels.

Discharge piping modifications involving five days' work were needed on one pump. This normally would have required blocking and draining the seawater intake tunnels which would have meant shutting down the condensers.

The alternative was to seal off the 30-in. discharge pipe of the single pump, then to close off the tide by using a butterfly valve to be installed at that time, above the pump.

A neoprene-coated nylon balloon, 30 in. in diameter and 5 ft long, equipped with handling rings, nylon ropes and air connections, was made. The balloon was lowered into the discharge pipe, then inflated so that it engaged the pipe walls tightly.

The piping above it was dismantled and the new valve installed just above low tide level. At low tide, the balloon was deflated, and withdrawn through the valve which was then closed. The piping modification was then completed in normal fashion. *From Elastomers Notebook, published by Elastomers Chemicals Dept., E. I. du Pont de Nemours & Co., Inc., Wilmington.*

Balloon is lowered into pipe before modifications are made

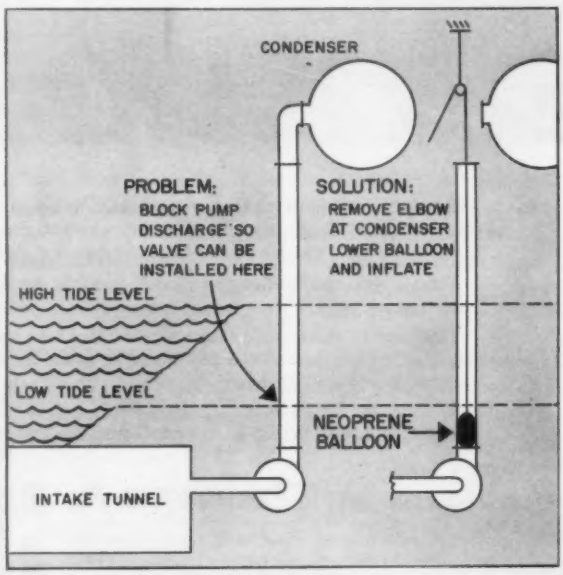


Diagram shows how pipe was blocked by neoprene balloon

Now, more than ever, engineers specify: "CONDULETS*... or approved equal"

After 51 years of use in every conceivable application, Condulets remain the standard of quality for rigid conduit fittings.

It's not hard to see why. Pick up any Obround Condulet, for example, and note such features as these:

TAPER TAPPING: Condulet threads are taper tapped to match tapered conduit threading . . . giving you a rigid joint that will not loosen . . . insuring *permanent* ground continuity!

INTEGRAL BUSHING: A smooth, rounded, burr-less surface that protects wire insulation.

WEDGE NUT COVER FASTENER: This exclusive Crouse-Hinds feature is part of the cover itself. Screws can't fall out. No screw holes to locate. No protruding screw hole ears to damage cable.

LONGER HUBS: Conduit can be tightened completely without bottoming on integral bushing. And there's generous surface space for good wrench hold.

MATERIAL: Feraloy, a special alloy that is strong and tough, resists corrosion . . . gives sharp, full threads.

FINISH: A triple-layer treatment that exceeds Federal and U.L. specs for longer-lasting protection.

Where else can you find all (or even *most*) of these features? You *can* find them all in each of the 45 types of Obround Condulets . . . sizes ⅛" to 6".

There is a type for every need, including a wide selection of interchangeable covers and wiring devices. Just call your Crouse-Hinds distributor and ask for "Condulets!"

*CONDULET is a coined word registered in the U.S. Patent Office. It designates a product made only by the Crouse-Hinds Company.

CROUSE HINDS

MAIN OFFICE AND FACTORY: SYRACUSE, NEW YORK

Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.

• CONDULET® ELECTRICAL EQUIPMENT (Explosion-Proof and Conventional) • FLOODLIGHTING • TRAFFIC CONTROL SYSTEMS • AIRPORT LIGHTING and WEATHER MEASURING EQUIPMENT

These products are sold exclusively through electrical distributors. For application engineering help, contact one of the following offices: Baton Rouge Birmingham Boston Buffalo Chicago Cincinnati Cleveland Corpus Christi Dallas Denver Detroit Houston Indianapolis Kansas City Los Angeles Milwaukee New Orleans New York Philadelphia Pittsburgh Portland, Ore. Salt Lake City St. Louis St. Paul San Francisco Seattle Tulsa Washington **Resident Representatives:** Albany Atlanta Baltimore Charlotte Chattanooga Jacksonville Reading, Pa. Richmond, Va. Shreveport

For more facts circle 528 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38

The mechanism to be cleaned was removed and, after cleaning, was reinstalled. The ice was then thawed and the machinery was ready for operation within eight hours from the start of the job. *From a release of Argonne National Laboratories, Lemont, Ill.*

Tough Pallets for Hot Service

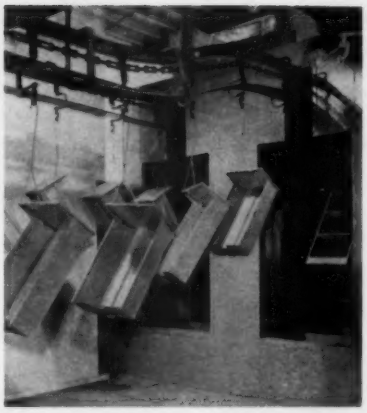
BY USING HIGH STRENGTH alloy steel pallets at the Cochran Foil Co., Louisville, Ky., a coil handling problem has been eliminated.

Originally, carbon steel pallets were used to handle the coils during a 12-hr cycle in an annealing furnace at 960 F. While the carbon steel pallets were tough enough for most handling problems, they warped badly upon prolonged exposure to the furnace heat, causing damage to the coils. These heat-deformed pallets also limited the height to which they could be stacked.

The high-strength pallets are 36 in. wide by 72 in. long, corrugated and formed in a latticework pattern, which permits free circulation of air while in the furnace. Reinforcing "stringers" are corrugated and located to provide distribution of support to the weight of the coils. They are made of an alloy steel with a minimum yield point of 50,000 psi and minimum tensile strength of 70,000 psi. *From a release of Republic Steel Corp., Cleveland, Ohio.*

Finishing For Steel Furniture

A SEMI-AUTOMATIC system for finishing steel office furniture of various sizes has been installed in the Los Angeles plant of the Art Steel Co., Inc. It was planned to provide maximum production with minimum manpower and to conserve floor space.



Conveyor carries spray painted parts into oven at left for baking at 350 F

The system, which occupies 6000

(Continued on page 42)

Loading Switch Units, Double-Deck Style, Into Box Car Is Simplified With This Dolly

THE MOST UNSATISFACTORY phase of shipping switch units from the plant of Delta-Star Electric Division, Chicago, Ill., was loading them "double deck" style into box cars. At times, "strong-arming" by up to six men was required to lift the 1000- to 1200-lb units to the upper level, in the small space available.

A group leader in the packing department, Emil Arciaga, designed a dolly, which, with a few features added, is now in use.

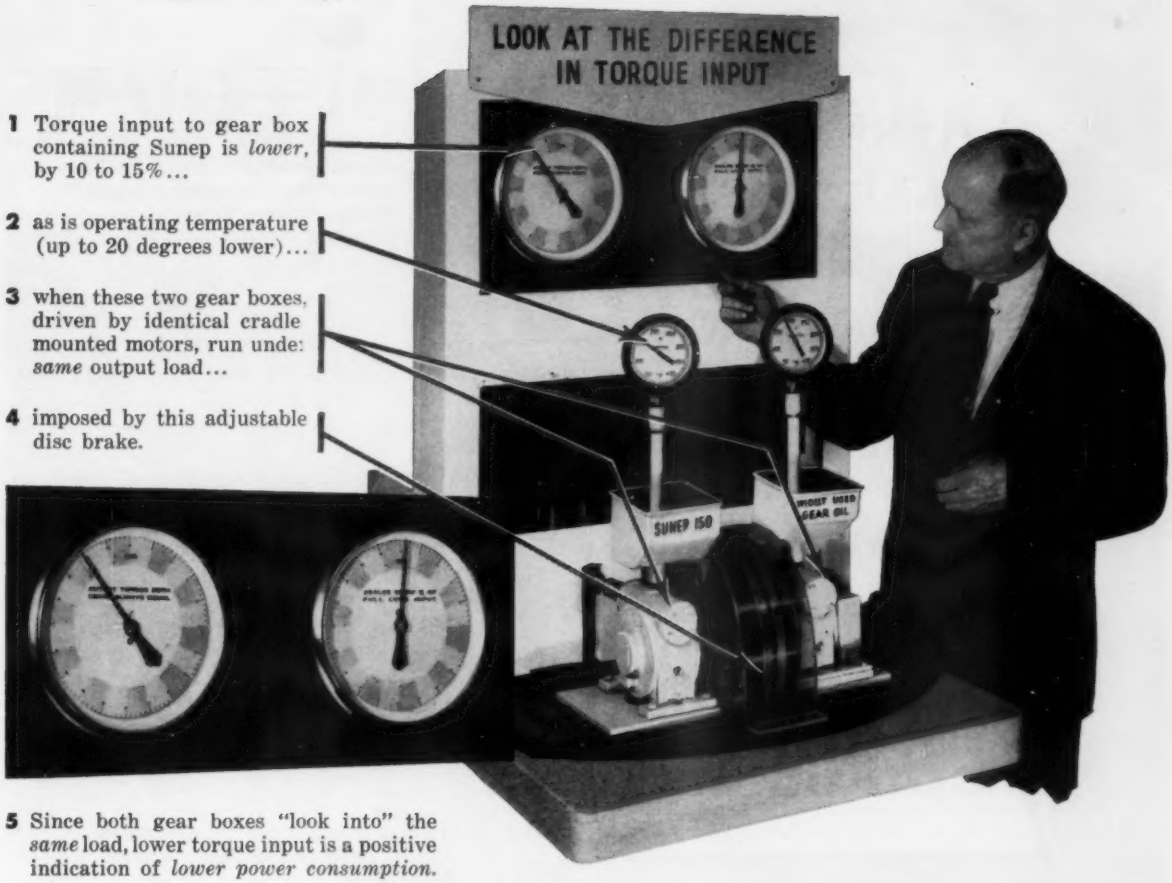
The dolly consists of a low, four-wheeled base on which stand two steel uprights with 18-in. long rollers atop them. These will support a switch base.

The steel uprights are adjustable vertically so that rollers can be raised to a height slightly above the cribbing over the lower tier of switches.

The dolly is lifted into the box car by a fork lift truck and positioned in the doorway with the rollers lowered (handles down). With the dolly in this position, the lift truck can raise a switch unit off the ground outside the car, and place it on the dolly. The loaded dolly is then wheeled opposite the location intended for the switch; the rollers are raised and latched by means of the handles and the switch is easily rolled almost into final position. A little sliding on the cribbing and the unit can be fastened into place.

With use of the dolly, two men are able to handle a majority of the units shipped; three men can handle the largest units. The dolly can be used for double decking boxed or crated items or for transporting pipes, bars, etc. in the shop. *From Porter People, Products and Places, published by H. K. Porter Co., Inc., New York, N. Y.*

Dolly designed by employee simplifies double-deck loading of switch units in box car


LOOK AT THE DIFFERENCE IN TORQUE INPUT
1 Torque input to gear box containing Sunep is *lower*, by 10 to 15%...
2 as is operating temperature (up to 20 degrees lower)...
3 when these two gear boxes, driven by identical cradle mounted motors, run under *same* output load...
4 imposed by this adjustable disc brake.
SUNEP 150
5 Since both gear boxes "look into" the *same* load, lower torque input is a positive indication of *lower power consumption.*

This test rig proves...

SUNEP CUTS POWER CONSUMPTION, REDUCES OPERATING TEMPERATURES

TIME AND AGAIN, under equal operating conditions, Sunep® gear lubricant has demonstrated its superiority over competitive oils. Sunep is a high-quality, extreme-pressure lubricant that is also recommended for screws and heavily loaded bearings.

In addition to extreme-pressure characteristics, Sunep has the ability to combat rust and corrosion. All additives are compatible and do not drop out during use or prolonged storage. These advantages add up to savings in money and equipment for you.

For complete information about Sunep oils, call your Sun representative or write to SUN OIL COMPANY, Philadelphia 3, Pa., Dept. PY-4.

INDUSTRIAL PRODUCTS DEPARTMENT

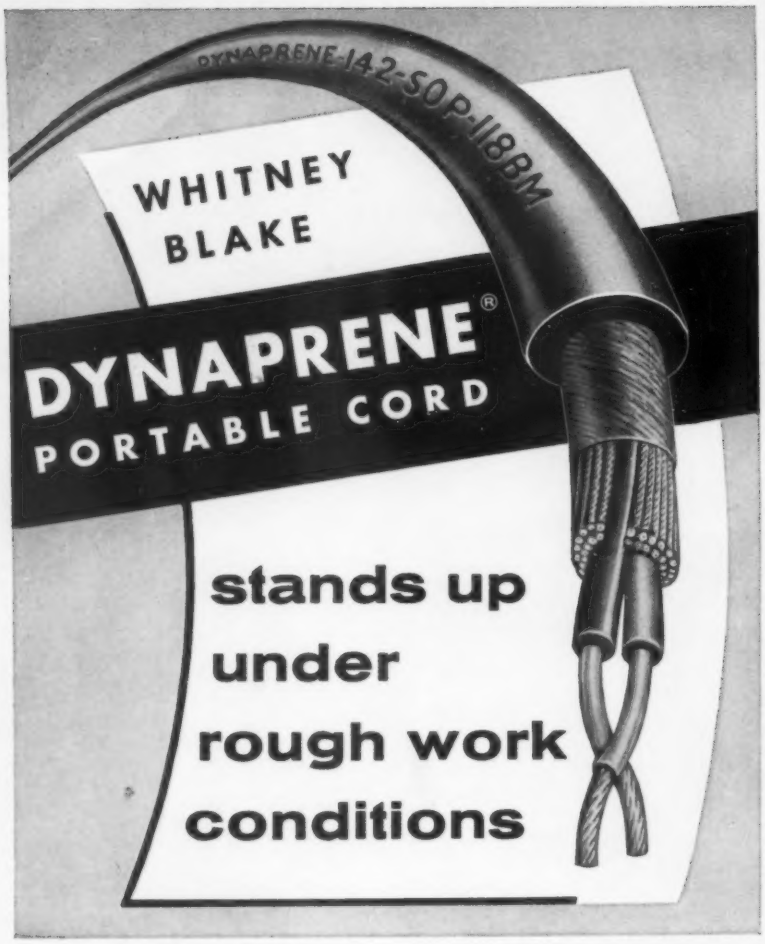
SUN OIL COMPANY Philadelphia 3, Pa.

IN CANADA: SUN OIL COMPANY LIMITED, TORONTO AND MONTREAL

SUNOCO

©Sun Oil Company

For more facts circle 529 on Reply Card



Where portable cord takes a beating because of rugged work conditions, WHITNEY BLAKE DYNAPRENE stands up and gives long, economical service.

DYNAPRENE has an especially tough neoprene jacket, it resists abrasion, has high flexibility and long flex life, and provides premium quality service at competitive prices.

Write TODAY for this complete catalog . . . FREE.

WELL BUILT WIRES SINCE 1899

WHITNEY BLAKE COMPANY

NEW HAVEN 14, CONNECTICUT

For more facts circle 530 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

sq ft of floor space, employs four paint sprayers and three operators working under two supervisors. It can handle 50,000 lb production daily.

After cleaning to remove shop dirt and grease, components are loaded on hooks on an overhead conveyor which travels 500 ft at eight to 10 fpm. Hooks are spaced two feet apart.

The first process consists of a three-stage, five-minute washing cycle in a solution of detergent, water and chromic acid at 180 F.

Next, units are baked at 400 F for three minutes, then are carried to opposed-type spray booths where two sides of the component are sprayed simultaneously. Each side location utilizes an air replacement system and water curtain. The components are then baked for 15 min in a convection type gas oven at 350 F. They are then unloaded from the conveyor and assembled.

Housing for each of the processing stages was designed individually to assure the correct time exposure to each. *From a release of Despatch Oven Co., Minneapolis, Minnesota.*

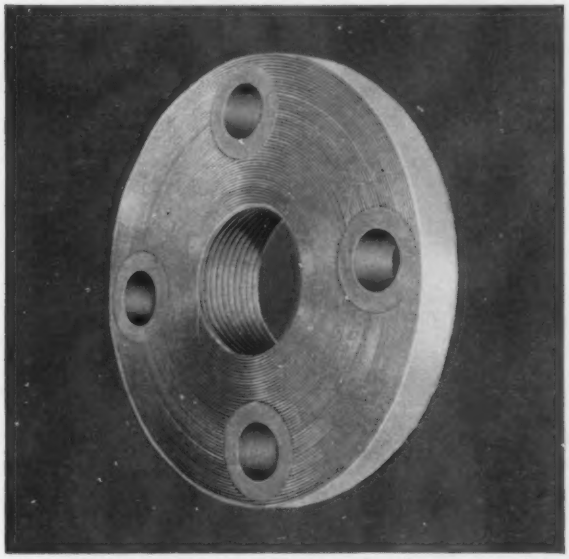
Warehouse Roof Parking Lot

WHEN MORE WAREHOUSE space was needed by Line Material Div. of McGraw-Edison Co., the only available space was the employee parking lot adjoining the plant. Use

Perlite domes are left in place in lift slab roof which will be used for parking

PVC PIPING NEWS

PUBLISHED BY TUBE TURNS PLASTICS, INC. • LOUISVILLE 1, KENTUCKY



ELIMINATES GASKET SLIPPING. To strengthen the grip on gaskets, Tube Turns Plastics has developed a line of flanges with concentric serrated faces. Prevent gasket slippage and help avoid overstressing of bolts. Available in all sizes.

EASY TO INSTALL. More and more engineers are specifying *unplasticized* PVC piping and ttp solvent cemented fittings because of the simplicity of making joints. Just cut pipe to length, paint on ttp Solvent Cement, and insert into fitting. Of course, where threaded connections are desired, there is a full line of ttp threaded fittings. Complete details in Bulletin 119, free on request.

FULLY IDENTIFIED. Every ttp fitting shows you impact grade, size, and quality control code number. This code number in ttp files tells complete history, including source of raw material, tests made on it, production data, and date. Here is further safeguard for your PVC piping when you specify ttp fittings and flanges.

EASY TO BUY. Your nearby ttp distributor carries complete stocks of unplasticized PVC fittings, flanges and valves, as well as ttp Solvent Cement and Thread Lubricant. His full line enables you to put all PVC supplies on one order to simplify purchasing. Above: At W. T. Andrew Company, Detroit.

Leading Manufacturer of Injection Molded Polyvinyl Chloride Pipe Fittings, Flanges and Valves

TUBE TURNS PLASTICS, INC.

Dept. PE-4, 2929 Magazine Street • Louisville 11, Kentucky

For more facts circle 531 on Reply Card

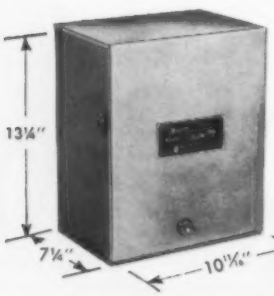
Norgren **MICRO-FOG LUBRICATION**

NEW...

Compact, Tamper-Proof Cabinet Units

lubricate all bearings, gears, chains and cams on a machine

These new Norgren units provide ideal lubrication by applying just the right amount of air-borne oil fog to all bearing surfaces. The standard unit includes an automatic-drain air line filter, a solenoid valve, a pressure regulator, a pressure switch and a MICRO-FOG Lubricator... *and provides the following important advantages:*



1 QT. OR 2 QT. OIL CAPACITY

200 OR 300 BEARING INCH RATING

- **TAMPER-PROOF**—Totally enclosed key-locked cabinet prevents tampering.
- **SPLASH-PROOF**—Coolant and corrosive liquids cannot reach interior of enclosure.
- **CONVENIENT TO SERVICE**—Removable one-piece top and side panel—secured by key lock—provides easy access for authorized personnel. Visual oil feed is proof of lubrication. Oil level gauge glass provided on lubricator.
- **SAFEGUARDS MACHINE COMPONENTS**—Pressure switch actuates alarm or shuts down machine if air pressure fails.
- **HEATER AND OIL LEVEL CONTROL OPTIONAL**—Thermostatically-controlled Heater, for 1 Qt. units, maintains lubricant temperature and viscosity. Oil level control actuates alarm or stops machine when oil needs replenishing.

For complete information, call your nearby Norgren Representative listed in your telephone directory—or WRITE FACTORY FOR NEW No. 900 CATALOG

C. A. NORGREN CO.

If it's Norgren... It's Dependable.

3443 SOUTH ELATI STREET ENGLEWOOD, COLORADO

For more facts circle 532 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

of this property would have involved buying adjacent property, demolishing residences and getting the area rezoned.

Upon investigation, it was found that $30,000 could be saved by building a new warehouse and utilizing the roof for parking.

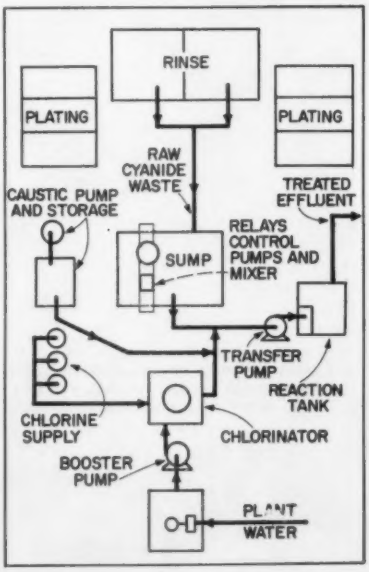
Problems of structural strength and insulation were solved by using concrete waffle slab with Acousti-Domes. New domes made of perlite were used and left in place to provide insulation.

The domes were laid out on the grade slab and the concrete poured after the steel was in place. Then the entire slab was lifted into place. There were no forms to remove and no insulation to apply.

The roof has an area of 53,213 sq ft. Live load was 80 lb per sq ft. *From Lift Slab News, published by Great Lakes Lift Slab Corp., Chicago, Ill.*

Plating Waste Treatment

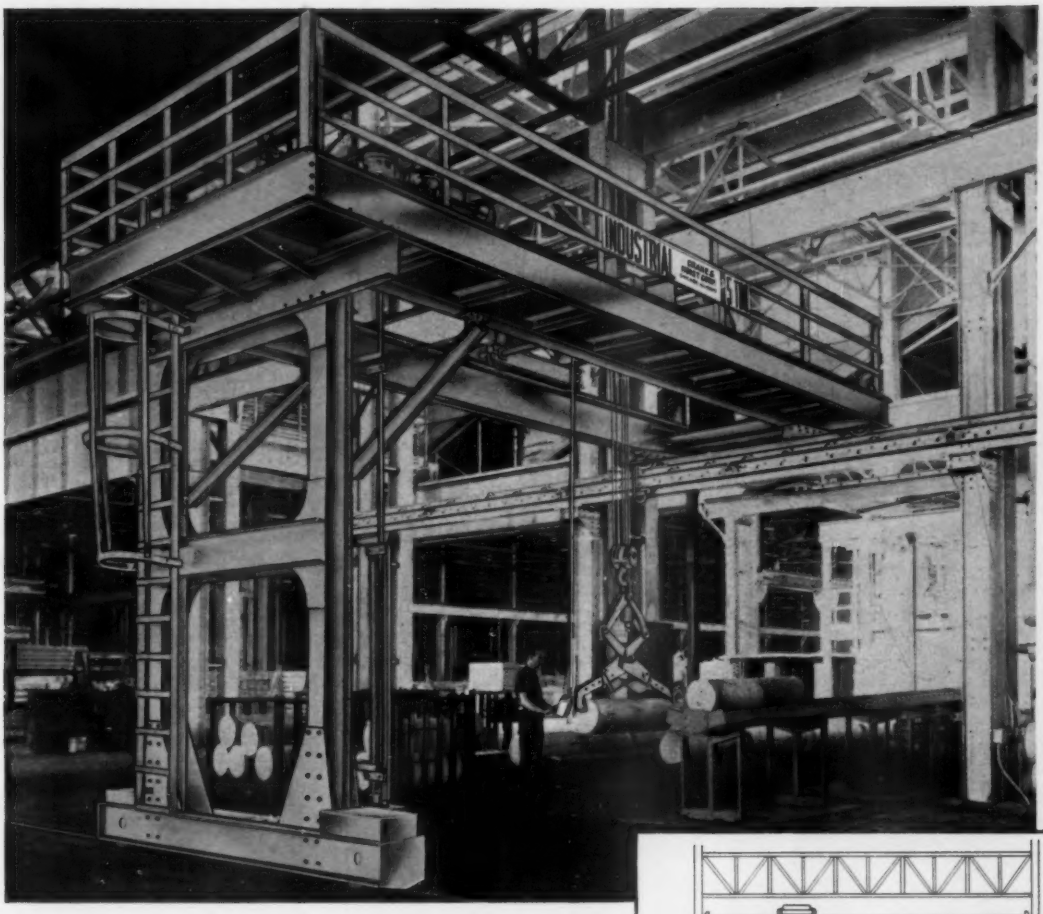
BECAUSE THE SEWAGE authority in the Mountainside, N. J., area uses bacterial methods of sewage disposal, which can be upset by plating waste, a limit of 2 ppm was set on the concentration of cyanide plating



Plan of plating waste treatment system

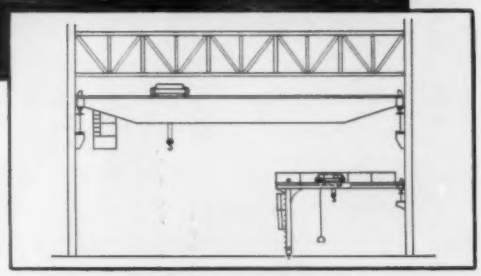
Industrial Semi-Gantries

SPEED BILLET HANDLING



An **Industrial** motorized Semi-Gantry does a production job handling billets from racks to a conveyor in a large metal plant.

Serving a local area in the factory the **Industrial** Semi-Gantry operates on its own runway—freeing the heavy capacity overhead crane for other important jobs, resulting in overall savings in operation and maintenance.



The diagram illustrates the relative positions of the Industrial Semi-Gantry and the heavy capacity overhead crane, both of which operate without interfering with each other.

Consult with **Industrial Crane & Hoist** for an economical solution to your materials handling problems.

Industrial CRANES

INGERSOLL B-W BORG-WARNER

INDUSTRIAL CRANE & HOIST

INGERSOLL PRODUCTS DIV. BORG-WARNER CORP.

1590 S. PAULINA STREET, CHICAGO 8, ILLINOIS

Export Sales: Borg-Warner International, 36 South Wabash Ave., Chicago 3, Illinois

For more facts circle 533 on Reply Card

Do you know what Diamond Double Pitch Roller Chain can do for you?

In plants everywhere, Diamond Roller Chains are doing many jobs including applications on conveyor systems, coordinating machinery functions, timing, lifting and driving.

Extreme accuracy, light weight, long life and high efficiency assure uninterrupted output. Data helpful in making proper selection are contained in Catalog 37. Write for a copy today.

Diamond Roller Chains and Sprockets are carried in stock by Distributors throughout the country.

New Catalog 37 tells how to select the chain and sprockets you need.

DIAMOND CHAIN COMPANY, Inc.

A Subsidiary of American Steel Foundries

Dept. 614, 402 Kentucky Ave., Indianapolis 7, Indiana

Offices and Distributors in All Principal Cities

DIAMOND ROLLER CHAINS

For more facts circle 534 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

waste discharged from the plant of the Palnut Co.

A flow-through system, using alkaline chlorination has provided an efficient method of treating the waste in a minimum of plant space. Chlorine gas and caustic are the chemicals used for the treatment.

The cyanide wastes originate at two rinse operations following plating operations. Both rinses empty into a 300-gal sump which provides 15 minutes' holding time for equalizing both waste flow and concentration. The waste is then pumped to an 800-gal reaction tank which provides a 30-minute contact time.

A vacuum-type chlorinator is used for feeding chlorine, while the 50 per cent caustic solution is added by a diaphragm pump. This treatment oxidizes the cyanide waste to cyanates in 10 minutes or less. *From WT Topics, published by Wallace & Tiernan Inc., Belleville, New Jersey.*

Plastic Spikes

A SPIKE about ¼-in. in diameter is being used by a lumber company to fasten logs together for the trip downstream from forest to sawmill. Use of these plastic spikes solves the problem of damage to saw blades at the mill by metal nails, since the plastic variety neither damages nor dulls the blades.

The spikes, made of a polycarbonate resin, are ground to a point in a pencil sharpener, then driven into the logs with an ordinary hammer. *From Building Science News, published by the Building Research Institute, Div. of Engineering and Industrial Research, National Academy of Sciences, Washington, D. C.*

Plant "Freeways"

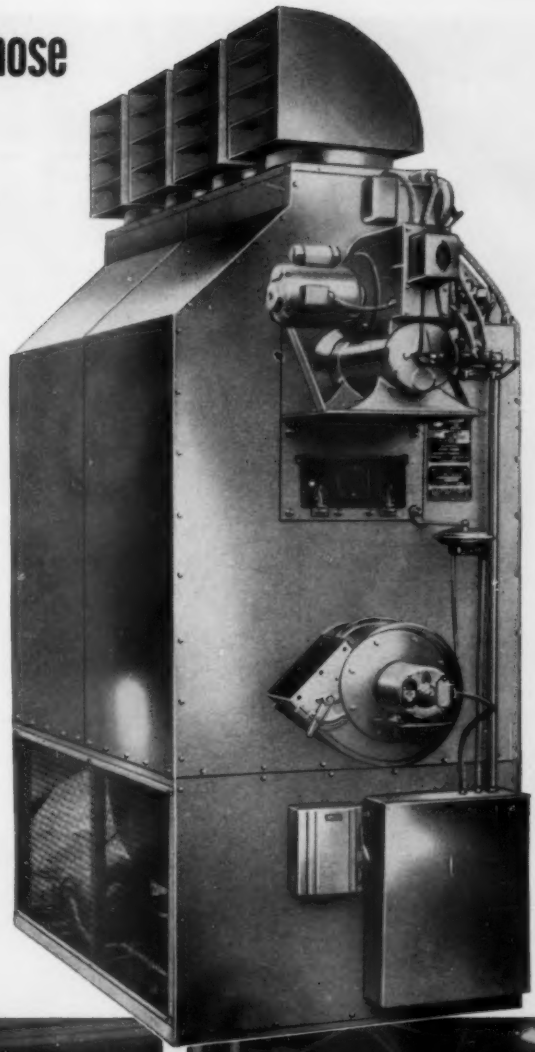
A NEW AISLE PLAN being used at our Fort Worth plant ensures a better flow of traffic in plant buildings. Certain aisles in the assembly and parts plant buildings are designated as "freeways" to provide emergency routes to key points on an around-the-clock basis.

No personal articles, skids, tools

Specify *LENNOX* for those

BIG heating jobs!

FROM THE WORLD LEADER IN WARM AIR HEATING COMES THIS NEW FIELD-PROVED INDUSTRIAL HEATER . . . 400,000 to 2,000,000 Btu/h

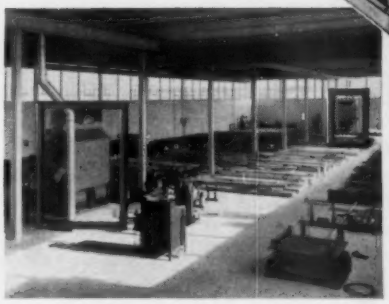


Installation flexibility; that's the Lennox "AT" series industrial heater. No task too large or small—designed for space heating, make-up air, drying or oven application—with your option of floor, horizontal or inverted units. And you can use oil, gas or combination fuel. In every installation Lennox engineering produces *exceptional* efficiency. Here are just a few of the reasons:

- ***4-pass counter flow design*—gets more heat from the flame (no internal baffles).**
- ***Double casing with metal radiation shield*—provides insulating curtain of air to hold DOWN cabinet heat losses.**
- ***Stainless steel combustion chamber*—prevents failure due to unrelieved stress. Warranted for 10 years!**
- ***One master controller. . .*eliminates non-standard, hard-to-replace control system components.**

Send for complete engineering data and specifications; see for yourself why plant engineers the country over are specifying Lennox "AT" series heaters!

One of four Lennox gas-fired heaters at C. A. Roberts Company, Detroit mfr. of steel tubing. Mounted at ceiling height, this space saving 500,000 Btu/h heater is tailored to the job.



Two oil-fired Lennox heaters in Wheelock-Lovejoy's steel warehouse (Centerline, Mich.) provide warm air heating for 20,000 sq. ft. Units are 750,000 and 1,000,000 Btu/h capacity.

Five gas-fired Lennox heaters at Wm. Montgomery Co. warehouse, King of Prussia, Pa. Fresh air introduced by heaters replaces the truck-exhaust foul air.

LENNOX Industries Inc.

INDUSTRIAL DIVISION

1701 EAST EUCLID • DES MOINES, IOWA

MAIL COUPON - - - Today

LENNOX INDUSTRIES INC.
Industrial Division, Dept. P4
1701 East Euclid, Des Moines, Ia.

Please send me—without obligation—complete specifications and engineering data on Lennox AT series Industrial Heaters.

Name_____

Company_____

Address_____ City_____

Title_____

For more facts circle 535 on Reply Card

eliminate the danger with
EMERGENCY LIGHTING
by STANDARD TRADEMARK

A temporary power failure in your plant can have disastrous results.

Eliminate the hazards of sudden darkness with the one emergency lighting system that is AUTOMATIC . . . INSTANTANEOUS . . . 100% ELECTRICALLY SUPERVISED—emergency lighting by STANDARD.

Write today for this new 20 page catalog containing complete information.

THE STANDARD ELECTRIC TIME COMPANY

89 LOGAN STREET • SPRINGFIELD, MASSACHUSETTS

For more facts circle 536 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

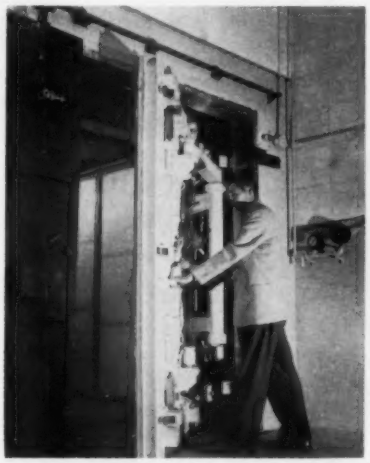
or other items may overflow into these aisles and no supplies, material, parts or equipment may be delivered to areas which do not have adequate space to prevent overflowing.

Parking of vehicles, including scooters and bicycles in these aisles is prohibited, except service vehicles during loading and unloading operations only. Lunch wagons are located on off-aisle sites. *From Convairiety, published by Convair, a Div. of General Dynamics Corp., San Diego, Calif.*

Sound Absorbing Doors

Two TEST CELLS used for determining the effects of engine noise on airplane structure are soundproofed so that the noise outside is about 70 decibels, compared with 190 inside.

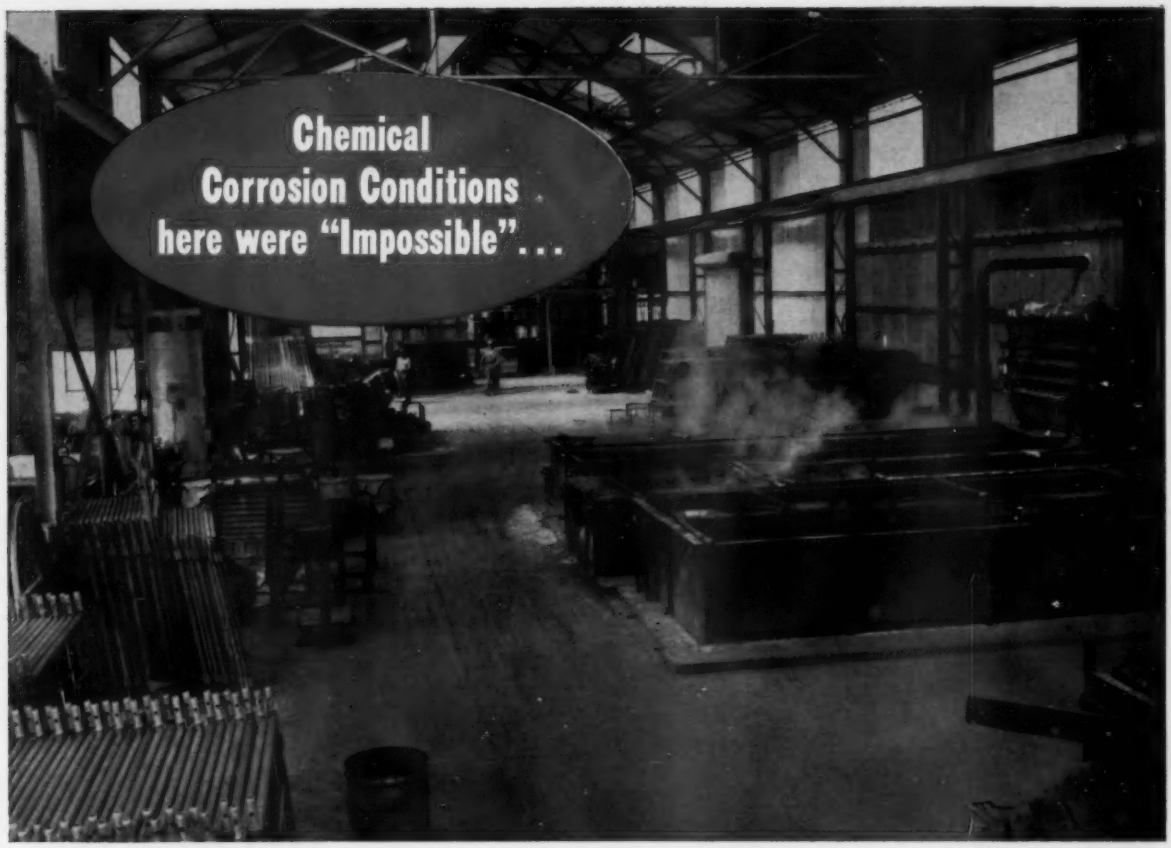
Each cell has three doors. The two outer doors, built of steel plate slide closed on overhead rails. Seals



Bank-vault type door, filled with sand absorbs sound generated by sonic tests

form a partial vacuum between them. Inner, bank-vault-type doors are hinged and are built with hollow interiors filled with sand for sound absorption and vibration dampening.

Latches operated by air pressure are a safety feature which prevents the doors from being opened while a test is in progress. *From a release of Boeing Airplane Co., Seattle, Washington.*



But TARSET® Stopped the Attack!

THE extreme corrosion conditions found in this metal finishing plant are seldom surpassed! Pickling and plating equipment, as well as structural steel, is under constant attack from fumes and spillage of sulphuric, nitric and chromic acids and cadmium and zinc salts. After several other protective materials failed, Pitt Chem *Tarset* was applied and stopped corrosion in its tracks.

No other protective coating on the market today offers you the broad corrosion-resisting properties and relatively low cost of this unique and patented Coal Tar-Epoxy Resin coating.

Wherever the going is roughest—on storage tanks, precipitator tanks, material conveyors and similar chemical plant equipment—you'll find *Tarset* is the recommended coating.

If you have a stubborn corrosion problem that you've labeled as economically "impossible" to control, it will pay you to investigate *Tarset*. Send today for complete technical data and samples for testing.

Think First of the Coatings that Last!

PITT CHEM
Coal Tar Coatings

PITT CHEM
"Insul-Mastic" Gilsonite Coatings

PITT CHEM
"Tarset" Coal Tar Epoxy Coating

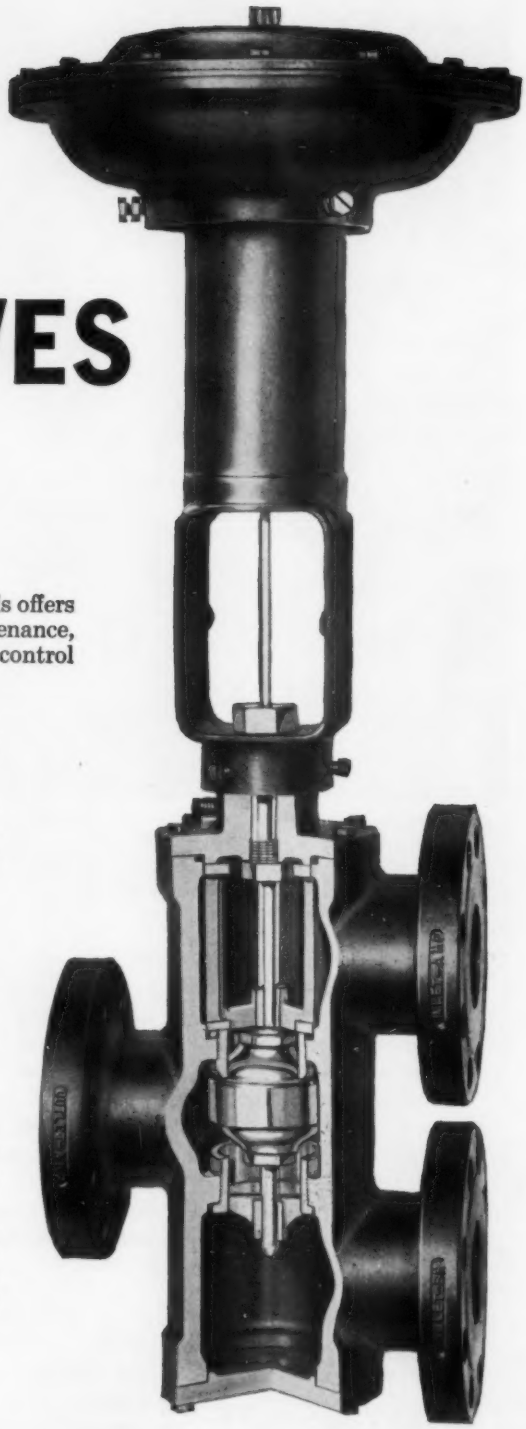
PITT CHEM Industrial Coatings are available through leading Industrial Distributors. See the "Yellow Pages."

COAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

For more facts circle 537 on Reply Card

NEW

JOHNSON THREE-WAY MIXING VALVES



Beat High Installation and Upkeep Costs

The new Johnson line of Three-Way Mixing Valves for liquids offers you substantial economies in both installation and maintenance, plus design features that assure consistent, high-accuracy control performance. Here's how:

- **Piping hookup simplified**—*straightaway piping connections eliminate elbows, allow faster, easier, less costly installation.*
- **"In the line" servicing**—*discs and seat rings can be replaced without removing the valve from the line. A big time saving feature that cuts upkeep cost and eliminates unnecessary downtime.*
- **High lift**—*for precise proportioning over wider range.*
- **No leakage**—*positive seating.*
- **Modulating plugs**—*assure uniform flow, greater accuracy.*
- **Constant total capacity**—*regardless of inner valve position.*
- **No slamming or water hammer**—*valve seats against the flow.*

The valves are furnished for either proportional or two-position control in sizes from 2½" to 6" and in 125 and 250 lb. standard construction.

Mail the coupon today for complete details on these efficient new valves. Or, better still, talk to a nearby Johnson engineer. The specialist Johnson organization offers the most complete line of pneumatic equipment for solving all temperature, humidity and pressure control problems.

JOHNSON SERVICE COMPANY
507-R East Michigan St., Milwaukee 1, Wisconsin
Please send me Bulletin Nos. V-210 and V-211 describing your new Three-Way By-Pass Valves.

Name & Title_____
Firm_____
Address_____
City & State_____

JOHNSON CONTROL
PNEUMATIC SYSTEMS
DESIGN • MANUFACTURE • INSTALLATION • SINCE 1885

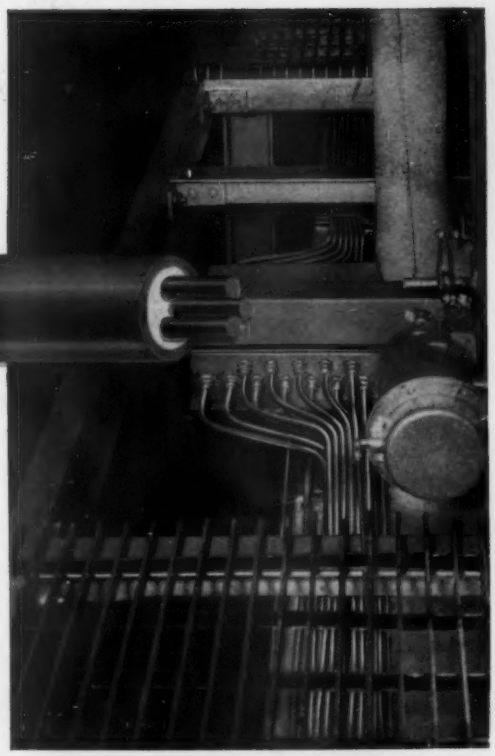
For more facts circle 538 on Reply Card

SAFETY m.i. CABLE

the answer to industrial power wiring...

- **SPACE SAVING**
- **Time saving**
- **Permanent**
- **INSTALLED EASILY**
- **Fast power wiring to cut down-time**

More and more General Cable's Safety MI 600 Volt Wiring System is being used because it can take the abuse of industrial application, giving trouble-free operation and unexcelled performance under the most severe conditions. Particularly adaptable in hot and wet locations. Available in 1, 2, 3, 4 and 7 conductor for power and control circuits.



MI terminating in main Japan Oven control center switchboard at Poinsett Lumber and Manufacturing Company, Anderson, S.C.

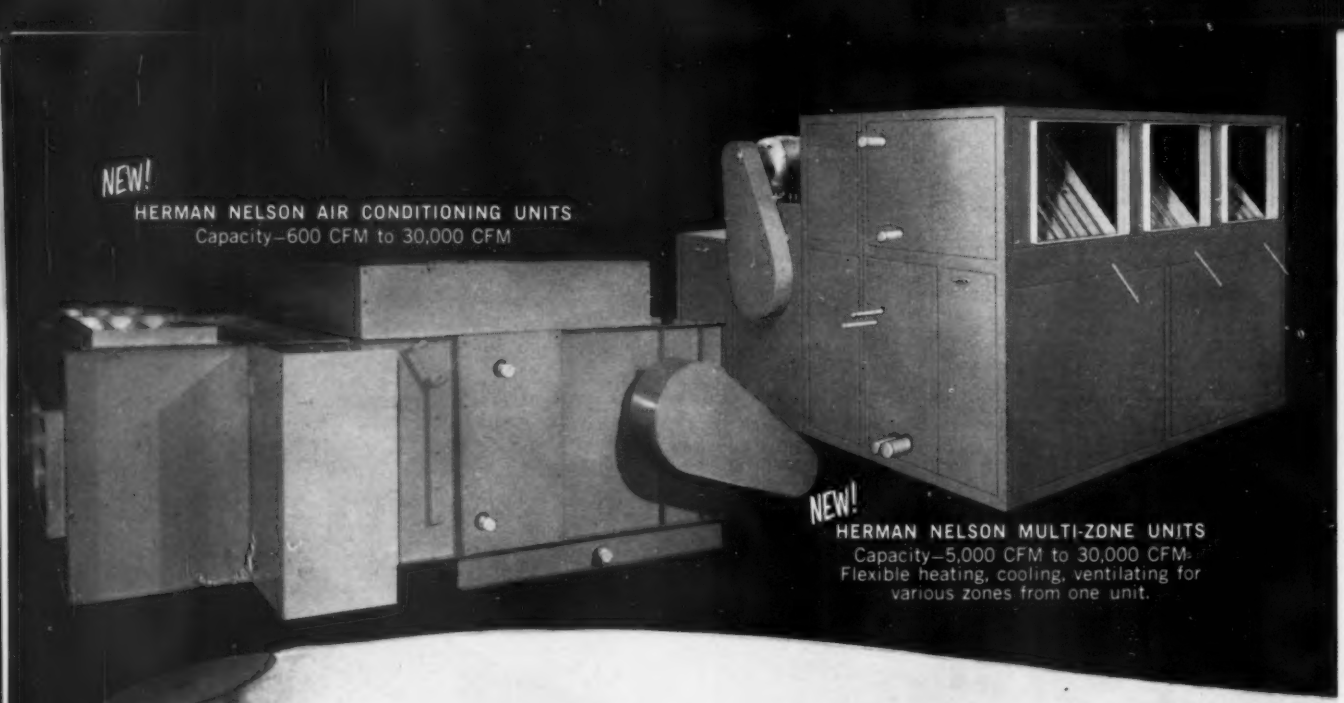
Ask for a Demonstration To-Day!

GENERAL CABLE CORPORATION, 420 Lexington Avenue, New York 17, N. Y.

Offices and Distributing Centers Coast-to-Coast

for quality and service... specify **GENERAL CABLE**

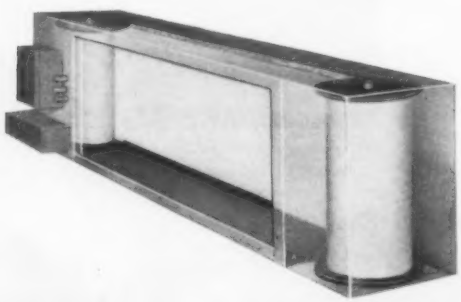
For more facts circle 539 on Reply Card



ALL NEW...AND

Complete new line of heating, ventilating, air conditioning and multi-zone units change their own filters, automatically

These new AAF-Herman Nelson lines incorporate some of the most advanced features found in any heating, ventilating and air conditioning equipment. Outstanding among these features is the exclusive Roll-O-Vent that automatically changes its own filters. It gives you maximum uniform filtering efficiency the year 'round, with little or no maintenance. Air filtering is always constant, because clean media is fed through automatically and at just the right time. One roll of media does the work of about a year's supply of disposable filters, at about one-half the cost. There's nothing to touch—not even a button. Think of the maintenance saving! Plan your new jobs with these AAF-Herman Nelson units . . . *all new . . . and Roll-O-Vent, too!*



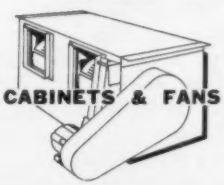
These four great new lines are ready to give you superior performance for any air handling need, large or small. There are 12 basic sizes of each unit—48 in all—handling from 600 CFM up to 65,000 CFM. Sectionalized construction permits installations "tailor made" to your specific requirements.

Better Air is our Business

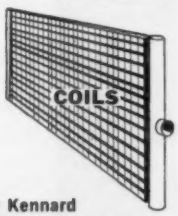
ROLL O VENT TOO

These air handling units are engineered throughout by AAF-Herman Nelson . . . one reliable source to solve all your heating, ventilating and air conditioning problems. Write today for further information.

EVERY AAF UNIT IS ALL American . . . ALL THE WAY!



+



+

= ONE MANUFACTURER
ONE RESPONSIBILITY
ONE HIGH STANDARD OF QUALITY

by Herman Nelson
a Division of AAF
Over 50 years experience in ventilation field.

by Kennard
a Division of AAF
Standard of excellence in coils since 1934.

by Air Filter
Division of AAF
World's largest manufacturer of air filters.

American Air Filter

COMPANY, INC. • 228 CENTRAL AVE. • LOUISVILLE, KY.

AAF
herman nelson

For more facts circle 540 on Reply Card

OPERATION AND PRODUCTION —pointers for the industrial plant engineer

Edited by Vernon T. Kempf

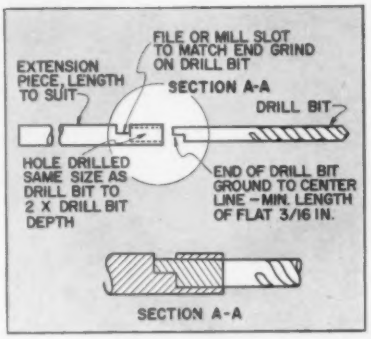
Versatile Extension Drill

Contributed by Douglas Bett

EXTENSION DRILLS are frequently made by welding a long rod to a drill. This ties up a lot of drills needed for regular work and makes sharpening the extra-length drills difficult.

Here is a drill extension that will permit rapid replacement of broken drills and allows them to be removed for sharpening. As the only modification required on the drill bit is a flat, ground on the shank of the drill, it can be used as regular length drill.

The extension rod should be at least 3/32 in. larger in diameter than the drill. A hole is drilled in one end to the same diameter as the drill and to a depth equal to twice the drill diameter. The end of the drill bit is ground flat to the centerline. The minimum length of this flat should be 3/16 in. A slot is filed or milled in the extension rod to match the end ground on the drill bit. The two parts should fit together with a light tap fit.


FILE OR MILL SLOT TO MATCH END GRIND ON DRILL BIT
EXTENSION PIECE, LENGTH TO SUIT
SECTION A-A
DRILL BIT
HOLE DRILLED SAME SIZE AS DRILL BIT TO 2 X DRILL BIT DEPTH
END OF DRILL BIT GROUND TO CENTER LINE – MIN. LENGTH OF FLAT 3/16 IN.
SECTION A-A

Drill extension features easy replacement and sharpening of standard bits

Electric Heat at Low Cost

Contributed by V. Budrionis, Plant Engineer, Verson Allsteel Press Company

ELECTRIC HEATING can solve many heating problems in areas remote from the main heating equipment. This is particularly true in industrial plants that are already using large amounts of power. Additional loads are added to the electric bill at the lowest block in the rate structure and may be as low as 0.6 cents per kwhr.

(Continued on page 56)

Automatic Flushing Stops Clogged Drains, Reduces Maintenance

Contributed by C. R. Wheeler, Plant Engineer, The Monarch Machine Tool Co.

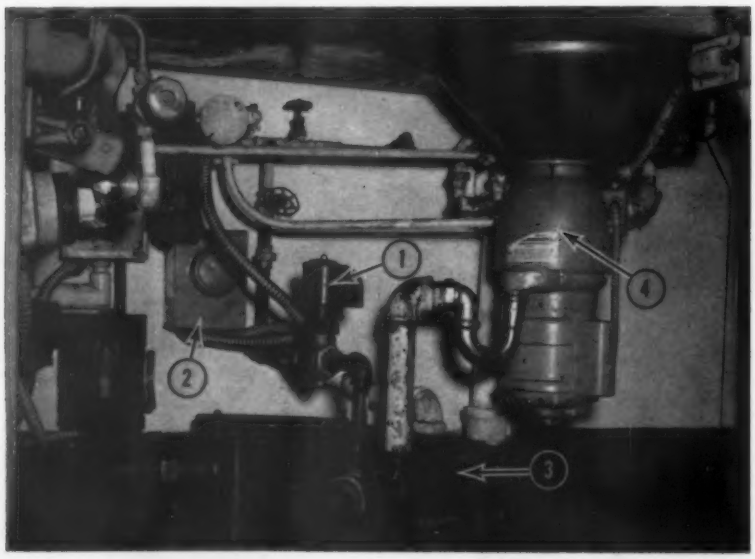
IN OUR PLANT cafeteria we have a dishwasher and garbage disposer which drain to a common three inch soil line. This line runs about 50 ft to an eight inch sewer main and then to the street sewer system. This three inch lateral frequently stopped up due to grease and refuse from the garbage disposer. When this happened, drain water from the dishwasher would back up into the cafeteria kitchen.

It was not considered feasible to tear out the floor and install a larger line and in addition it would have been difficult to install a line with more pitch to the eight inch sewer main.

We set up a weekly preventive program calling for systematically rodding this line with a power sewer machine and also added a commercial sewer cleaner once a week to cut out the grease. Even with this costly program, heavy disposer loads caused stoppages.

To reduce this maintenance expense we installed a one inch, normally closed, solenoid in a water line that was connected to the three inch sewer line. An off delay timer was arranged to energize the solenoid for a predetermined time after each use of the disposer. This permitted a flow of water directly into the sewer line for around three minutes after the disposer was shut off to flush out any residue.

Since the installation of this simple device we have had no trouble or maintenance expense on this sewer line. The cost of the water used is insignificant compared to the downtime, confusion, and maintenance expense caused by the previous stoppages.



Solenoid (1) controlled by timer (2) allows a flow of water through sewer (3) for a predetermined time after disposer (4) is shut off to keep line clear of refuse

At Rhoads, the Job Selects the Belt

In the Rhoads' family of beltings, there is a flat belt that is exactly right for your operating conditions.

It may be Tanastic, new leather/plastic belting with a stretch-free nylon core.

It may be Texalon, new all-synthetic belting of fabric and nylon . . elastic and almost 100% stretch-free.

It may be Tannate leather belting, the product of more than 250 years of tanning experience.

Rhoads' Engineers Consider All of the Factors Involved

The advantages of the flat belt drive — economy in original cost and in operation; highly efficient speed reduction; shock absorption; high degree of safety; flexibility in placement of motor — all these advantages and many others are used by Rhoads' engineers.

Based on the job the belting is to do, and the operating conditions involved, Rhoads recommends the belting that is engineered to your needs.

Tanastic

leather/plastic belt . . . no unscheduled shutdowns

In Rhoads' Tanastic you get the ideal combination of strength and elasticity — the ability to absorb shock loads and transmit full power uniformly, smoothly and efficiently — with no unscheduled shutdowns for tension adjustments. On cone drives the narrower Tanastic belt (usually one-third the width of previous belts) permits faster driven speeds and a wider variety of speed changes.

Tanastic can be used effectively on a wide range of belt applications . . replacing present leather, rubber or V-belts and easily designed for new installations. Let us quote Tanastic for a specific drive or write for new bulletin. Address Engineering Department, J. E. Rhoads & Sons, Wilmington 99, Delaware.

RHOADS

Since 1702 . . . Pioneers in Mechanical Power Transmission

For more facts circle 541 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 54)

Another factor to consider is the effect of a proposed heating load on the maximum demand registered in the plant. In our case, maximum demand occured in the summer months due to a large air conditioning load. As we are on a yearly demand schedule, adding demand in the winter months has no effect on costs, provided we do not exceed the summer demand peak.

All these factors were considered when we were faced with the problem of heating a maintenance shop isolated from the main heating equipment. This area, of 5,000 sq ft, would require about 180,000 Btu. We had estimated the costs of operating a packaged oil burner to be approximately $1.05 per hr.

Vito Budrionis, Plant Engineer, adjusts thermostat on one of the 20 kw heaters

We installed three, 20 kw, Chromalox unit heaters with a rating of 68,000 Btu each. The total load of 60 kw would cost 0.36 cents per hour of operation. Each unit is controlled by a thermostat that operates a contactor. The units are connected directly to the 440-v, three phase power lines through a suitable protective switch.

This installation was completed in 1954 and the results, after several heating seasons, have proven satisfactory to the men in the shop and in their effect on our electric bills.

Install Pipe Railings Faster

Contributed by Roger Isetts

WHEN INSTALLING pipe railings around the plant, the usual method of constructing them is to weld a plate to the bottom of the pipe and

(Continued on page 58)

Shop-Made Float Switch Solves Several Maintenance Problems

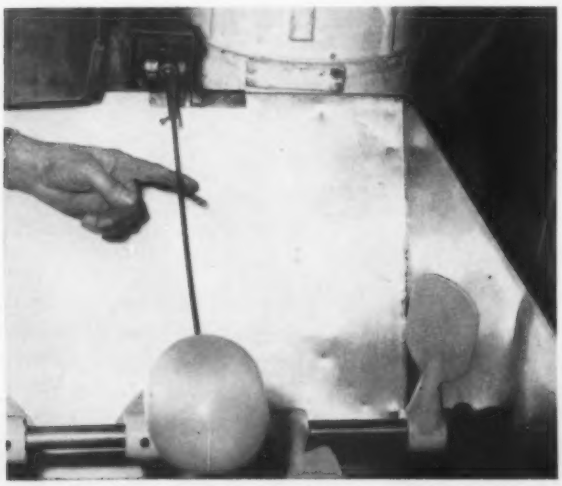
Contributed by C. D. Fulton, Plant Engineer, Old Dutch Foods, Inc., Blas-dell, N. Y.

REGULATING the operation of two colloid mills, used to emulsify salad dressings, required practical solutions to a number of problems. A sufficient amount of product had to be maintained in the bowl that supplies the jar filling machine and controlled to prevent overflow.

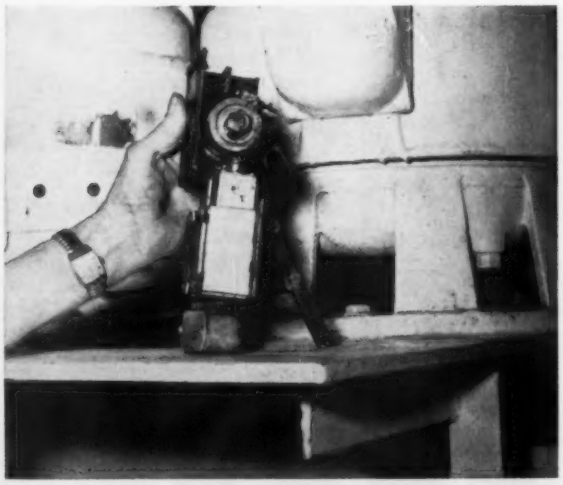
This was accomplished by attaching the assembly to a lip that was formed to fit snugly over the top edge of the filler bowl and was wide enough to insure horizontal stability of the unit. Vertical rigidity was accomplished by a metal bar extending down the side of the bowl.

As the float was located beyond the discharge area of the mills, it required a long float-rod. As there was danger of bending this rod when the assembly was removed for cleaning, the rod was made readily detachable. This was accomplished with ordinary grease fittings. The two parts are connected with a simple push and twist and make a secure union that can be readily detached for cleaning.

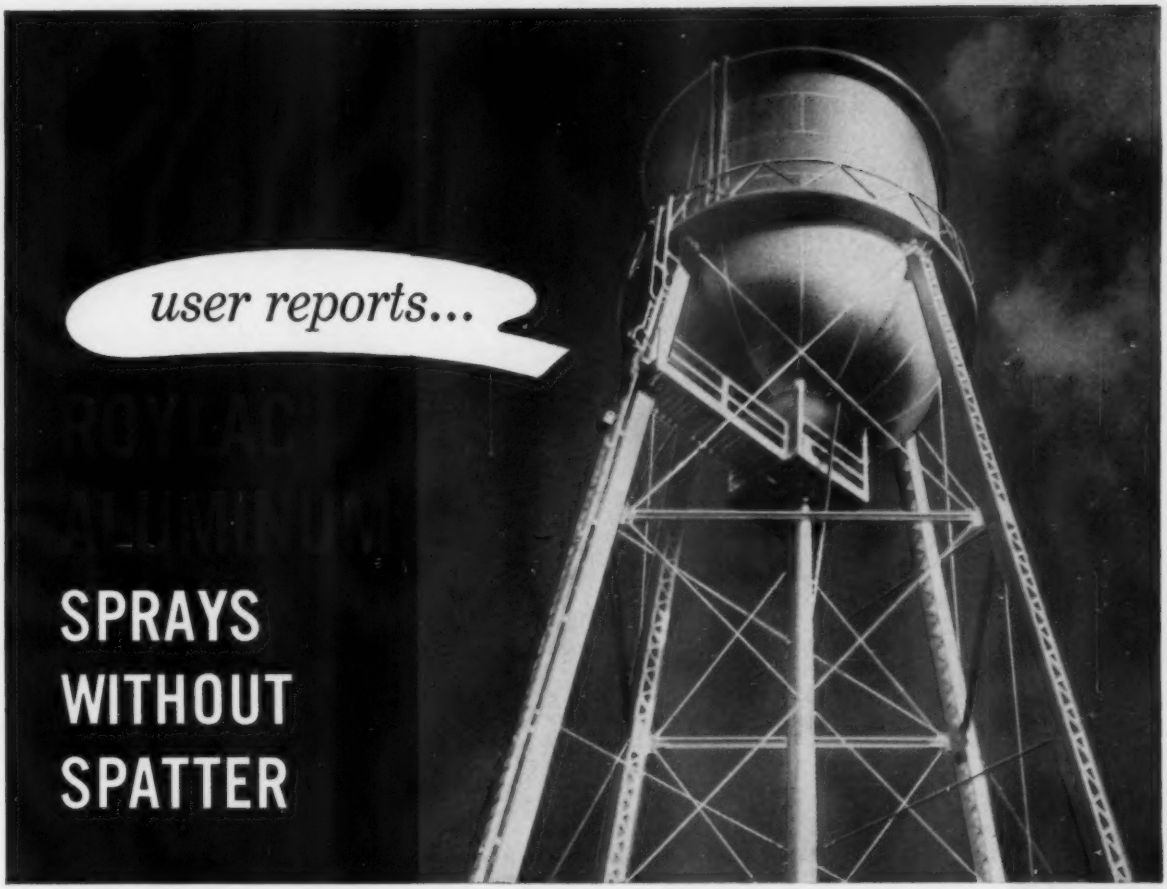
Two Microswitches are employed to control the mill motors. One normally open switch closes when the float rod reaches its lowest position and starts the mills. The second switch is normally closed and opens to stop the mills when the float reaches its top position. A three wire rubber covered cord and plug connect the switches to the motor control and permit easy detachment.



Float switch assembly is supported by a bracket that rests on edge of mixing bowl and permits easy removal for cleaning



Float-rod operates cam rollers that open and close switches. Cord connection to control allows removal of entire unit



Southeastern S & T Maintenance Co. spray-painted this overhead tank with Roylac Aluminum, reports no liability problem from "fall-out." Roylac Aluminum, which dries in motion within four feet of travel from the gun, was developed by **Royston Laboratories**, Blawnox, Pa.

Maintenance company sprays overhead tanks with no liability problem

Having trouble spraying paint out-of-doors? A user reports that Roylac Aluminum eliminates the danger of property damage. Now wire fence and other open-work metal can be sprayed without spattering shrubs or buildings. With Roylac, there's no "fall-out" when maintaining overhead tanks or bridge structures.

Mr. J. L. McCloud, Southeastern Steel & Tank Maintenance Co., writes, "On tanks with web or lattice type legs, it's almost impossible to do a thorough job with a brush, and it's hazardous from a liability standpoint to spray with ordinary paint. But by spraying with Roylac Aluminum, we get even coverage, excellent appearance —and no damage claims."

Roylac Aluminum, made with ALCOA® Aluminum Pigment, is a special development of Royston Laboratories, Inc. This manufacturer tells us this paint dries in motion within four feet of travel from the gun, falling away as a cottony, non-adhesive powder.

PIGMENTED WITH ALCOA ALUMINUM ALUMINUM COMPANY OF AMERICA

"ALCOA THEATRE"
Exciting Adventure
ALTERNATE MONDAY EVENINGS

ALCOA does not make paint, but ALCOA Pigments are used in more aluminum paints than any other brand. Special formulas have been developed by paint manufacturers like Royston Laboratories to solve individual problems. Paints made to these formulas actually cost less, last longer, give utmost protection against heat, cold, sun, rain, smoke and fumes.

Write today for our two free booklets, *Painting With Aluminum* and *Aluminum Asphalt Roof Coatings Make Time Stand Still.* They contain valuable up-to-date information on all types of aluminum paint and aluminum asphalt coatings. Use the coupon.

Aluminum Company of America, Paint Service Bureau
1790 D Alcoa Building, Pittsburgh 19, Pennsylvania

Please send your free booklets:

☐ *Painting With Aluminum*

☐ *Aluminum Asphalt Roof Coatings Make Time Stand Still*

I am interested in protecting_____

Name_____

Company_____

Address_____

City_____ Zone____ State_____

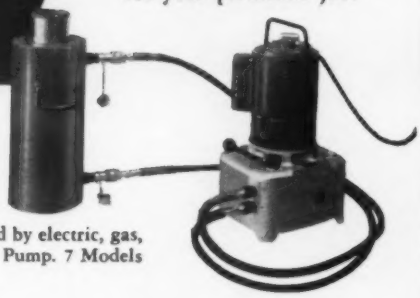
For more facts circle 542 on Reply Card

BIG 4

IN HYDRAULIC JACKS AND PULLERS BY SIMPLEX

...cut costs

Whether you push-pull-or-lift, SIMPLEX Hydraulic Equipment guarantees you satisfaction. The "BIG 4" described below are furnished in *28* models. You will find a SIMPLEX unit for your particular job.



1 "RE-MO-TROL" PULLERS

The "Re-Mo-Trol" Puller Unit is a powerful hydraulic Ram connected by high-pressure hose and remotely operated by electric, gas, air-powered or with hand-operated Pump. 7 Models have *"center-hole"*.

CAPACITY	APPLICATIONS	BENEFITS
10-100 tons 11 models	tensioning wire in pre-stressing concrete, pulling or pressing sleeves, gears, pinions, etc.	lift-pull-or-push in any direction easily & safely from a distance!

2 SIMPLEX "JENNY" CENTER-HOLE PULLERS

The "Jenny" is a rugged, *self-contained* unit for pulling or pushing the most difficult jobs with hydraulic power and efficiency.

CAPACITY	APPLICATIONS	BENEFITS
30-100 tons 6 models	mines, oil fields, shipyards, railroads, diesel, general maintenance, post tensioning concrete, etc.	push-pulls-lifts without torque through "center-hole".

3 ROL-TOE JACKS

CAPACITY	APPLICATIONS	BENEFITS
10, 25 and 50 ton 3 models	for toe lifting heavy machinery and equipment, also transformers.	lifts full capacity on cap or toe!

4 STANDARD HYDRAULIC JACKS

CAPACITY	APPLICATIONS	BENEFITS
3-100 tons 8 models	all general construction industrial maintenance problems.	smooth lift power, service-free operation!

500 lb. "Jack in a Box"

This 3" high Simplex Screw Jack will lift 500 pounds two inches. Has all operating and construction features of larger screw jacks. Also is ideal desk ornament, paper weight. 50c ea. Shipped prepaid cash or check.

WORLD'S LARGEST MANUFACTURERS OF INDUSTRIAL MECHANICAL AND HYDRAULIC JACKS

SIMPLEX JACKS

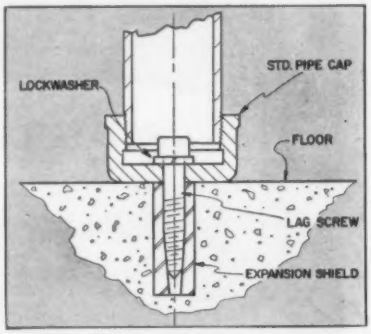
TEMPLETON, KENLY & CO.

2561 Gardner Road • Broadview, Illinois

For more facts circle 543 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 54)



Pipe cap, anchored to floor, serves as support for railing around equipment

then fasten the plate to the floor with two or more anchors. Another method uses a standard floor flange that requires three or four anchors.

Here is a simple way to do the same job much faster with less cost. Standard pipe caps are anchored to the floor and the upright pipes are then screwed directly into the caps. This arrangement uses just one anchor for securing each upright and eliminates the necessity of any welding.

This method provides little support against side strains and should not be used on long runs of straight railings. It works very well with "ell" and "U" shaped railings.

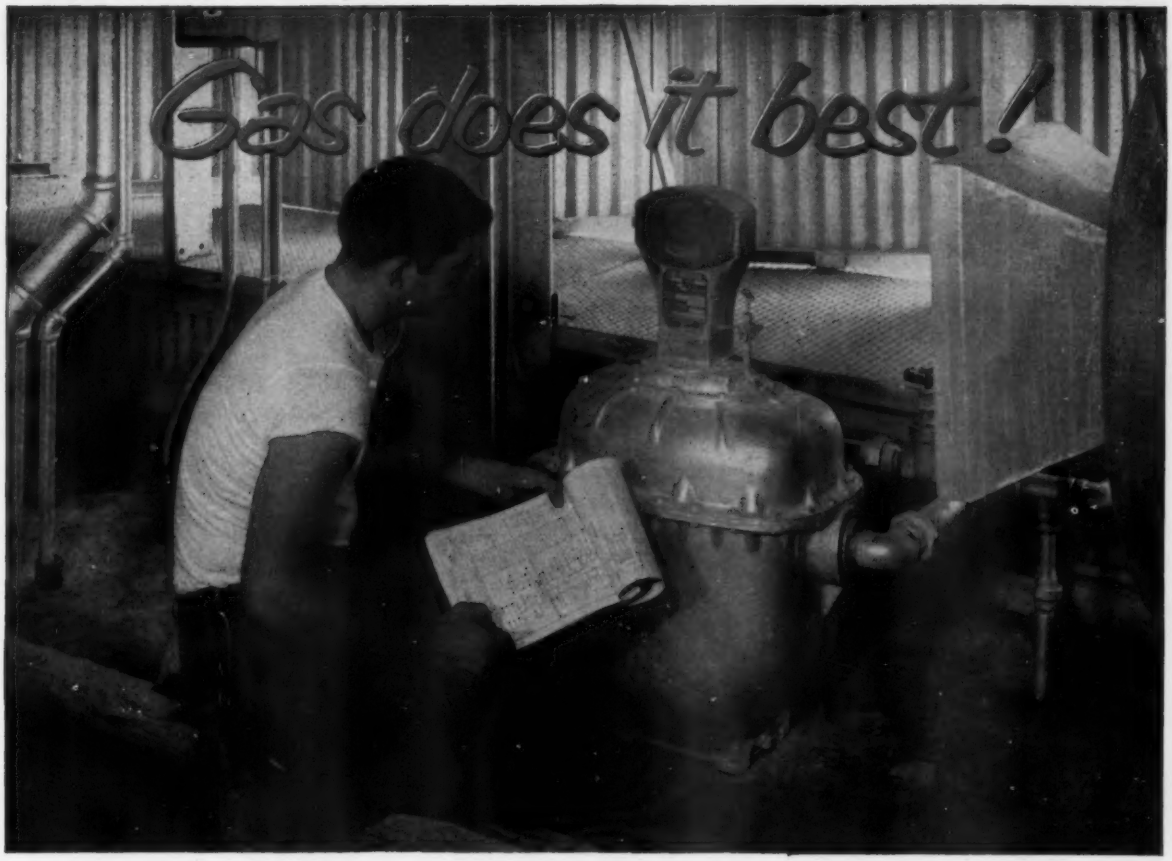
Emergency Foundation Bolt

Contributed by Charles H. Willey

CONVENTIONAL methods of securing foundation bolts are not always available when a machine must be moved to a new location on short notice. A simple substitute can be made in your own shop.

The lower, or bottom end of the foundation bolt is threaded back about 1½ in. and is drilled to the same depth. Two hacksaw cuts are made at right angles to each other to permit the threads to expand. This expansion is provided by a taper pin inserted in the hole previously drilled in the bolt.

The hole in the concrete foundation is drilled to the same size as the foundation bolt and can frequently be drilled after the machine is in place. The taper pin is started into the hole in the bottom of the



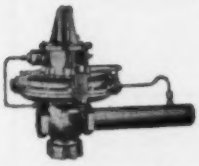
METER YOUR INDIVIDUAL FURNACES TO CONTROL QUALITY AND COSTS

When you process with gas, metered records of consumption will quickly show up combustion deficiencies that affect the quality of your end product. Meters standing guard at every burner will discourage wasteful fuel practices. And only from metered records of the fuel used can you arrive at accurate costs.

Why don't you investigate the advantages of metering individual furnaces, kilns or ovens? Learn the economies of using Rockwell meters as production tools. *Write us or use the handy coupon.*

Good Combustion Requires Close Regulation

For Low Pressure Burners



For High Pressure Burners

Good combustion control is the key to good process control. Rockwell makes a complete line of pressure regulators for all types of industrial burners. Use the coupon for full details.

ROCKWELL
GAS METERS
and REGULATORS

CLIP COUPON—MAIL TODAY

Rockwell Manufacturing Company
Pittsburgh 8, Pa.

Gentlemen:

I am interested in your meters for measuring gas to individual furnaces ☐. Your pressure regulators for burner control ☐. Please send literature ☐. Have representative call ☐.

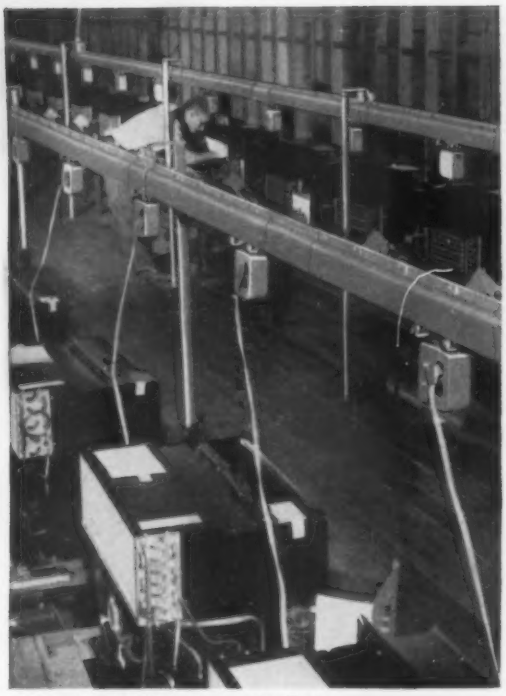
Your Name_____

Company_____

Street_____

City_____ Zone_____ State_____

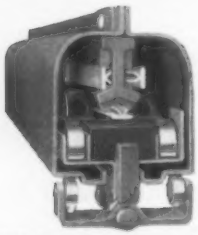
For more facts circle 544 on Reply Card



Air Conditioning Units Undergoing Test.

96.1%* of plant engineers say...

"our company has benefited from steel-enclosed trolley busways"



Flexible Feedrail systems, in capacities from 60 to 500 amperes, provide convenient movable power sources for cranes and hoists; production, conveyor assembly, and moving test lines; portable and machine tools; cutting and sewing rooms; business machines; lighting; and motor control.

Survey was conducted among 2,036 plant engineers by an impartial organization and printed in a leading trade magazine. Write for free copy of entire survey.

That's not surprising when you think of what Feedrail steel-enclosed trolley busways can do!

Take test line operations, for example. Feedrail delivers power through *overhead mobile outlets that move right along with the product being tested.*

RESULT: work moves smoothly from station to station. No hazardous, dragging cables on floor or conveyor line. Personnel moves about freely and safely. Inspection and maintenance cut to a minimum. Downtime is reduced — production increased!

Whatever test requirement or work flow you set up — there's a Feedrail system to handle it. Surprisingly easy to install, Feedrail can also be easily relocated or extended. And it never becomes obsolete!

Find out how *your plant* can benefit from Feedrail steel-enclosed trolley busways. Send today for Bulletin. Write Dept. P4.

SOLD BY MORE THAN 1,000 ELECTRICAL DISTRIBUTORS FROM COAST TO COAST

TB

ELECTRIC FEEDRAIL

Never Becomes Obsolete

FEEDRAIL CORPORATION

Subsidiary of Russell & Stoll Company, Inc.

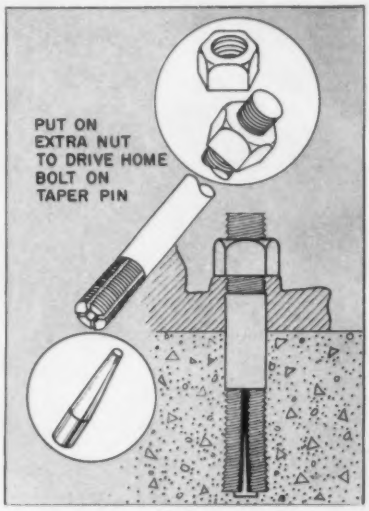
125 BARCLAY STREET • NEW YORK 7, N. Y.

SPECIALLY QUALIFIED REPRESENTATIVES IN PRINCIPAL CITIES

For more facts circle 545 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 54)



Simple foundation bolt can be made with tools found in average work shop

bolt and dropped into the hole. A nut is screwed on the top of the bolt to prevent thread damage during the driving operation.

When the bolt is driven down onto the taper pin, the threaded lower ends spread out and bite into the sides of the hole, securely locking it into place.

$10.00 Reward

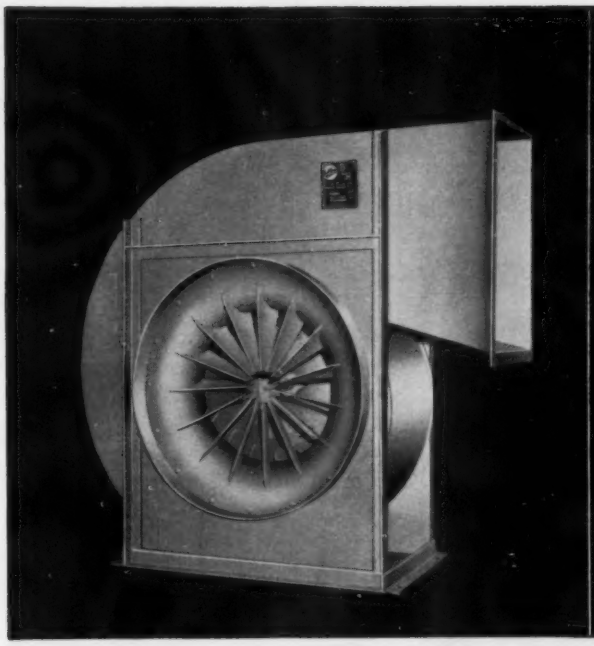
WANTED . . . Items of interest to plant engineers.

PLANT ENGINEERING will pay $10.00 minimum for each item accepted for publication. These items should describe a useful improvement or modification to plant equipment and buildings or more efficient use of any facilities. Items should be accompanied by a sketch and/or a photograph. Send all entries to Editor, O & P Dept., PLANT ENGINEERING, 308 East James Street, Barrington, Illinois.

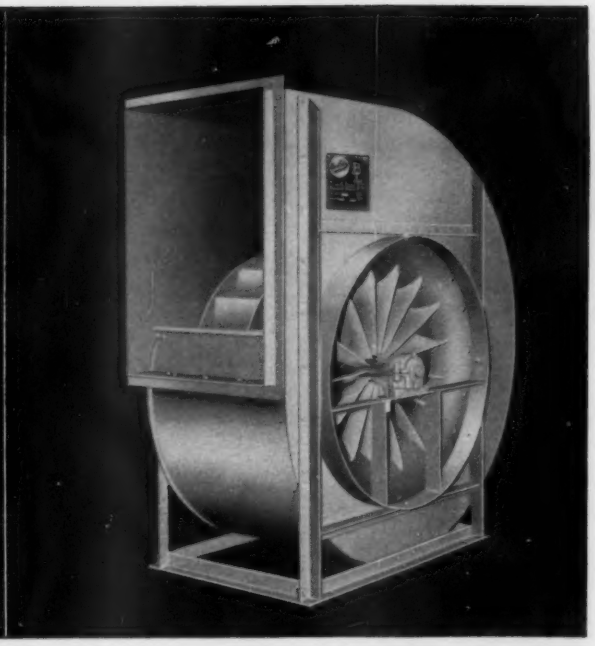
Flotation Lifts Buried Tanks

Contributed by H. Muller

AT TIMES we have to remove unharmed, buried storage tanks for use elsewhere around the plant. Since



For Classes III-IV (High Pressures) The "Buffalo" Type "BLH" Fan



For Classes I-II (Moderate Pressures) The "Buffalo" Type "BL" Fan

FOR THE BEST ENGINEERED JOBS, SPECIFY BUFFALO "JOB-SUITED" FANS

For central system applications you don't have to accept a "compromise fan", loosely designed to cover any and all pressure requirements. "Buffalo" builds *two* fans, each engineered to fulfill specific pressure requirements to the highest possible degree. Brief engineering details on these "no compromise" "Buffalo" Fans are given below.

The "Buffalo" Type "BLH" Fan is recognized by engineers and contractors alike for its outstanding performance in Classes III and IV service. The "BLH" maintains an extremely high mechanical efficiency of 86% over a broad operating range. The smooth inlet bell with matching shroud, directional inlet vanes, backward-curved blades and divergent outlet all contribute to quiet operation and minimum turbulence. "Buffalo" engineering features, plus husky construction, add up to an efficient high pressure fan that will deliver long, faithful, maintenance-free service. When you plan a conduit system or other Class III-IV installation, be sure to specify the "BLH". Call in your "Buffalo" representative or write for Bulletin F-200.

The "Buffalo" Type "BL" Fan has gained wide acceptance for peak performance in major Class I and II installations throughout the country. Non-overloading, the "BL" provides quiet, stable, output from free delivery to shutoff. The smoothly-curved inlet bell, with directional guide vanes and matching shroud, assures minimum turbulence. Highest efficiency is attained by the streamlined wheel with backward curved blades, factory tested and balanced to hold vibration to an absolute minimum. The correctly shaped scroll of the wheel-contoured housing further contributes to smooth air flow. For full information on the rugged, reliable "BL" Fan for Class I and II conditions, contact your "Buffalo" engineering representative. Or, write direct for Bulletin F-104.

You get a *value dividend* with the "Q" Factor — the built-in QUALITY that provides trouble-free satisfaction and long life in *every* "Buffalo" product.

BUFFALO FORGE COMPANY • Buffalo, New York

Buffalo Pumps Division, Buffalo, New York

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING

For more facts circle 546 on Reply Card

Give maintenance a lift . . .

Keller 86-2V20, ½-ton air hoist.

a break . . . air power . . .

B87B Paving Breaker.

Model RP-125 Rotary Portable.

with Gardner-Denver air tools

Make the most of maintenance hours and team up with air tools from the quality Gardner-Denver line. They're built right, stay on the job, get the work done fast at lowest cost.

Choose from: Overhead Air Hoists • Single- and Double-Drum Air Hoists • Paving Breakers • Trench Diggers • Sheeting Drivers • Backfill Tampers • Utility Drills • Sump Pumps • Impact Wrenches • Nut Setters • Ratchet Wrenches • Grinders • Gas and Diesel Rotary Portable Compressors.

Write for complete information on the tools of your choice.

ENGINEERING FORESIGHT PROVED ON THE JOB
IN GENERAL INDUSTRY, CONSTRUCTION, PETROLEUM AND MINING

GARDNER-DENVER

Gardner-Denver Company, Quincy Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Ave., Toronto 16, Ont.

For more facts circle 547 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 54)

the soil is invariably so pressure-packed that a lot of labor would be required to raise the tank, we simply dig all around the tank and then fill up the resulting pit with water.

The water not only loosens the soil, but floats the tank effortlessly to the top. A little rocking of the tank is sometimes required to break it loose from the bottom of the pit.

Old Ladder Becomes Pipe Rack

Contributed by Harry J. Miller

DON'T THROW AWAY that old, unsafe extension ladder. It may be the answer to the problem of storing

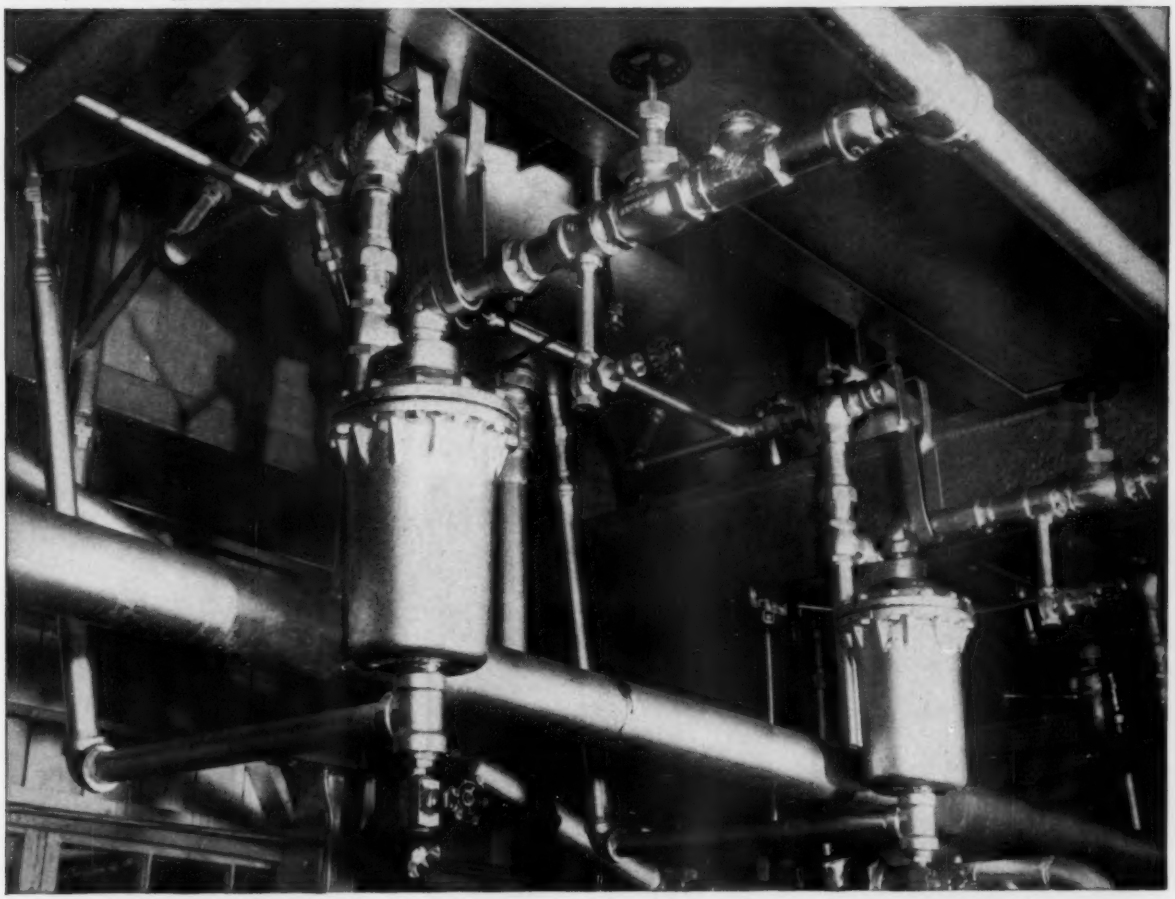
Old extension ladder goes back to work as pipe rack, saves time locating shorts

conduit and pipe shorts. When these shorts are piled on the floor, selection of size and length is difficult. Most workmen would rather take a full length and cut the size they need than to try to find the size required in a floor pile. This not only wastes new pipe but increases the amount of these shorts.

Supports are nailed to the ladder to hold it in a horizontal position about 30 in. above the floor. The spaces between the rungs form pockets and only one size of pipe is kept in each pocket. Since the shorts are stored in the pockets vertically, it is easy to spot a short of the required length.

For best results, this rack should be set up indoors next to the cutting and threading machines. If mounted

How to Get More Work Out of Steam Heated Equipment



Armstrong "Unit Trapping" Increases Production 30%...

WRONG WAY—"Group Trapping"

● One trap drains a group of steam condensing units. This causes "short-circuiting," entrainment of air, low and erratic temperatures. Ask for Bulletin 825 for complete details.

RIGHT WAY—"Unit Trapping"

● One trap drains each steam condensing unit. Condensate and air are removed as fast as they accumulate. This assures top temperatures and peak performance all the time.

If anywhere in your plant you have more than one steam heated unit or coil being drained by a single steam trap, give a listen to these manufacturers:

30% More Production, 30% Less Fuel—Armstrong "Unit Trapping" brings cranberries in cooking kettles to a violent boil the very instant the kettle is filled. See photo.

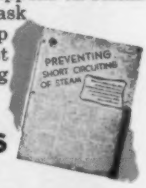
Dryer Temperatures Up 37%—A creamery tried three methods—group trapping, blow-through, Armstrong Unit Trapping. Unit trapping upped temperature 84° over group, 59° over blow-through and saved steam.

Cooking Time Cut 75%—One trap for each kettle reduced cooking time from 49 min. to 10 min. for soybean processor.

100°F Dryer Temperature Increase—Difference noted by a dairy company on two spray dryers.

It doesn't matter whether you operate jacketed kettles, dryers, evaporators, retorts, cookers or what, the principle is the same. Armstrong *unit trapping* always makes equipment perform better.

GET COMPLETE DETAILS—Armstrong Bulletin No. 825, "Preventing Short Circuiting of Steam" tells the how and why of "group trapping" versus "unit trapping," explains what happens in steam condensing units. Also, ask for 44-page Steam Trap Book. Free on request to your local Armstrong Representative, or:



ARMSTRONG MACHINE WORKS
9126 Maple Street • Three Rivers, Michigan

ARMSTRONG STEAM TRAPS

For more facts circle 548 on Reply Card

NEW! EXCLUSIVE!

MOST POWERFUL
700w, 400w, 250w. REFLECTOR
MERCURY LAMPS

Easily Installed

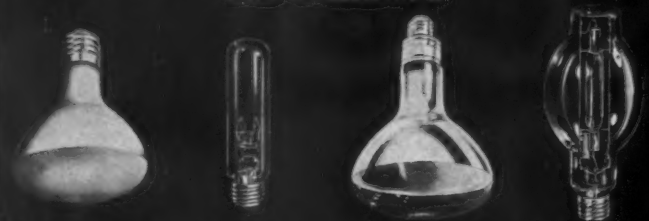
Nickel-plated brass base won't corrode or freeze in socket. Extra clamp assures support for R80.
Weatherproof hard glass. No heavy, enclosed fixture needed. Low-cost installation.
Sealed-in reflector stays bright without cleaning throughout lamp life.

RADIANT

R60 and R80 MERCO-SPOT, MERCO-FLOOD, and MERCO-WHITE Lamps for high, medium, and low bay and outdoor lighting.

MORE LIGHT · LESS POWER · LET US PROVE IT

SEND for BULLETIN 27



R-type incandescent lamps 150 to 1,500w. | Spatterproof welding lamps 50 to 150w. | Hi-Heat Infra-Red Lamps 250 to 500w. | 250, 400, 700, and 1,000w mercury lamps.

RADIANT LAMP CORPORATION

300 Jelliff Avenue Newark 8, N. J.

Manufacturers of Lamps from 50 to 10,000 watts for PROJECTION • SPOTLIGHT • FLOODLIGHT • INFRA-RED AERONAUTICAL • MOTION PICTURE PRODUCTION • MERCURY VAPOR • GENERAL SERVICE

For more facts circle 549 on Reply Card

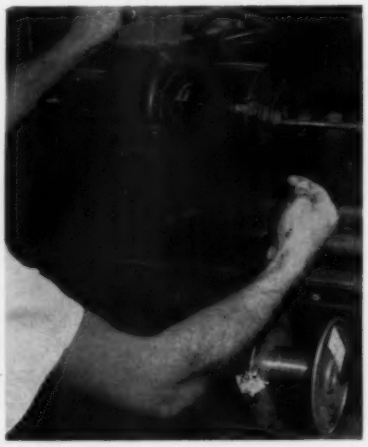
OPERATION—PRODUCTION

(O and P begins on page 54)

on a concrete floor, a wood plank should be placed under the rack to protect the ends of the pipes.

Lathe Winds Brazing Rings Fast

BRAZING RINGS are made rapidly from a spool of silver alloy wire at Fenwal Incorporated, Ashland, Mass., manufacturer of temperature controls and fire detectors. The brazing wire, furnished by Handy and Harman, New York, is used for the production brazing of high-



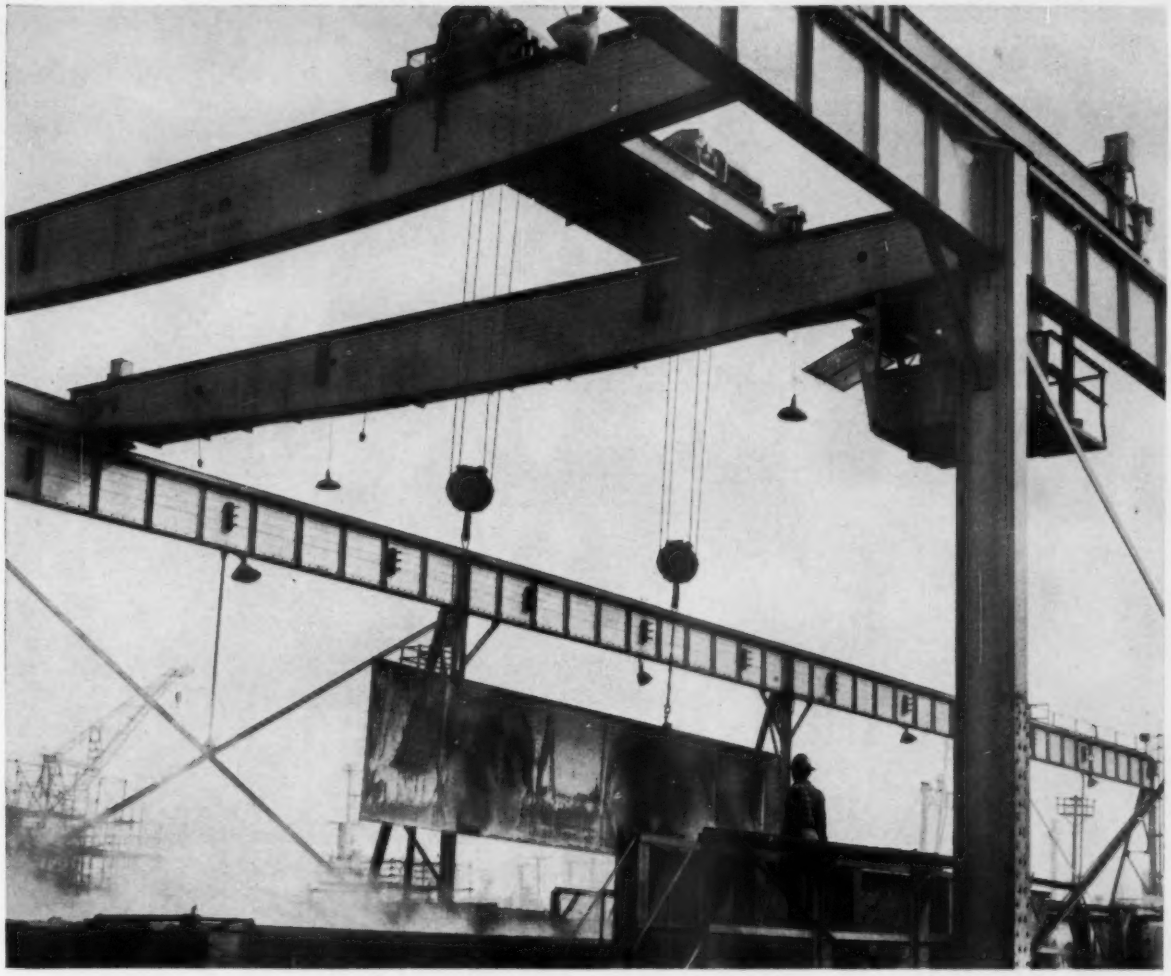
Several hundred brazing rings can be made in a short time on this lathe setup

strength joints in a wide variety of ferrous and non-ferrous metals.

To start the coil, the end of the wire is inserted through a hole in the mandrel and is secured by bending it around the circumference of the mandrel. The operator rotates the chuck for a few turns by hand to obtain the proper lay of the wire on the mandrel before starting the lathe. With a little practice the operator can quickly establish the required balance between feed wire and lathe speed to build up a compact coil of proper tightness on the mandrel.

The coil should be wound just loose enough so that it can be slipped off the mandrel without difficulty. When coiling to specified outside diameter, the mandrel diameter must be two wire widths smaller than the desired outside diameter of the ring.

Gulf Metalcoat A has protected this crane for 4 years—working above sulfuric acid pickling tanks! The coating is still in excellent condition.



Protect metal against corrosion up to 10 times longer with

NEW GULF METALCOAT A

Brush, dip or spray metal surfaces with this revolutionary aluminum pigmented liquid coating. New Gulf Metalcoat A protects metal under the most severe exposures in marine and industrial atmospheres . . . and protects it over longer periods of time at lower cost. A 4-year salt spray test at Wrightsville Beach, N. C., proved that new Gulf Metalcoat A gave 7 to 10 times greater protection than competitive products!

Gulf Metalcoat A is recommended for piping, fences, machine parts, transportation equipment, ships, metal roofs, stacks—practically any type of steel structure.

It can be applied to rough or smooth surfaces, and the metal doesn't even have to be entirely rust-free before application! Temperature changes won't affect Gulf Metalcoat A. And it can be removed easily by a petroleum solvent, in those cases where only temporary protection is desired!

Your Gulf Sales Engineer can show you how much less it costs to protect against rust and corrosion with new Gulf Metalcoat A. Just call him, at the nearest Gulf office.

GULF

GULF OIL CORPORATION
Dept. DM, Gulf Building
Pittsburgh 30, Pa.

For more facts circle 550 on Reply Card

Fish Scale Proves Cleveland Tramrail Easy Rolling

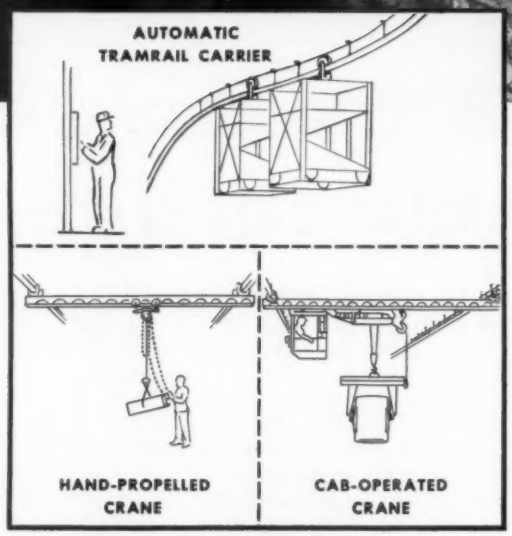
FOR decades Cleveland Tramrail has advertised the following guarantee covering all cranes and carriers it produces:

Guaranteed Starting Effort 15 lbs. and Running Effort 10 lbs. Per Ton Weight.

Recently a machinery manufacturer used a fish scale to check the pull required to move his hand propelled Cleveland Tramrail crane, which was loaded with a machine weighing 1750 lbs. The crane itself, including hoist carrier, weighed 913 lbs. The total load, therefore, was 2663 lbs.

The test indicated a pull of 12 lbs. was required to start the load and 10 lbs. to keep it moving. On the basis of ton weight moved, the starting effort was 9 lbs. and running effort 7½ lbs. Obviously, the test proved the soundness of Cleveland Tramrail's guarantee.

Because of a number of outstanding design features, all Cleveland Tramrail equipment is unusually smooth operating, whether it be hand propelled, motor-driven, or completely automatic. In fact, Cleveland Tramrail equipment rolls so easily that often hand propelled equipment can be used where motor-driven is normally found necessary.



CLEVELAND TRAMRAIL

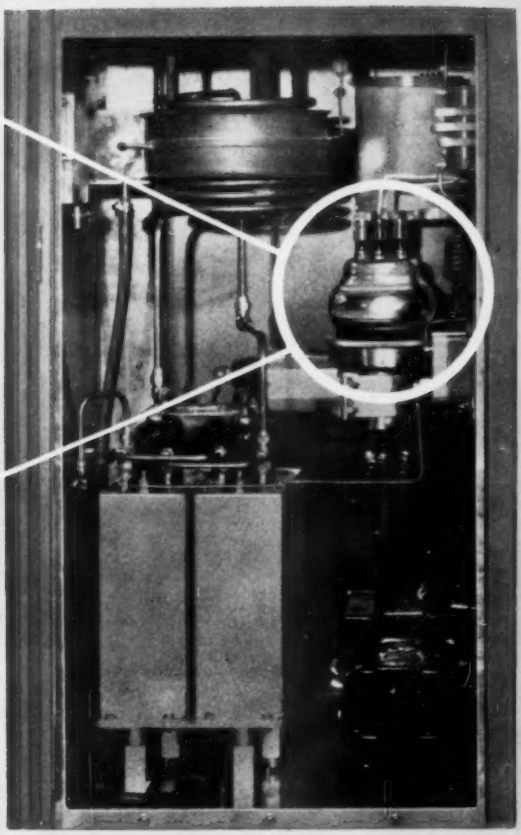
Overhead Materials Handling Equipment

Write for free booklet—2008.

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO., 7538 E. 290TH ST. • WICKLIFFE, OHIO

For more facts circle 551 on Reply Card

Now...get all the power you pay for!



General Electric's new GL-7085/356 is full-power replacement for the 356/5771 and 880*!

Your heater-tube replacement dollars buy full power output when you install the new General Electric GL-7085/356. You get top-rating plate voltage and current at high frequencies . . . tested into every tube before shipment!

Also, you get strong, shock-resistant tube construction (see facts at right). You get the dependability and manufacturer responsibility that are associated with every G-E product.

Heater performance and production in your plant will benefit as soon as you put this new, sturdy, full-power General Electric tube to work. Phone your G-E tube distributor for fast service! *Distributor Sales, Electronic Components Division, General Electric Company, Owensboro, Kentucky.*

* *With Type 880 only, a filament-transformer adjustment is required. Modification instructions are supplied.*

You can count 100% on these General Electric GL-7085/356 ratings:

- At 25 megacycles, max DC plate voltage is 12.5 kilovolts; max plate input, 60 kilowatts.
- Tube will dissipate 22.5 kilowatts with water flow of 12 gallons per minute.

You can rely on full-power tube performance day-in, day-out, because:

- New GL-7085/356 is ruggedly built—has strong, self-supporting filament, plus fernico glass-to-metal seals that withstand stresses.
- Every tube is factory-tested by General Electric for top-rating performance at 25 megacycles—*must prove it can do the job you expect of it.*

Progress Is Our Most Important Product

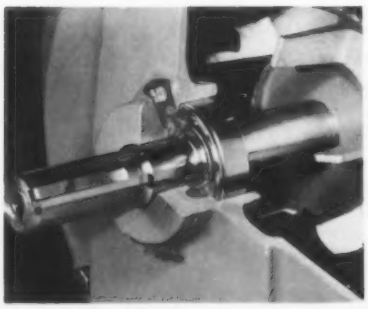
GENERAL ELECTRIC

11-12-101

For more facts circle 552 on Reply Card

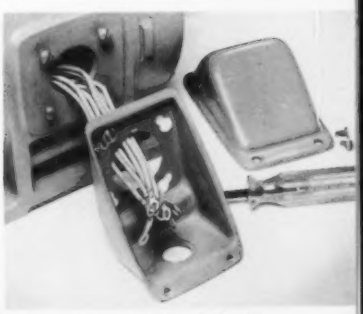
Reduce maintenance time and costs,

Better Protected against dripping or splashing liquids, this G-E motor is suitable for many jobs where an ordinary dripproof motor cannot be applied.



Long-life Bearing System seals grease in—dirt out. New longer-lasting grease increases bearing life. Bearings can be relubricated for even longer life.

Perma-numbered Leads are always easy to identify, even when taped or clipped. Non-wicking insulation keeps moisture from running up leads.



Easy-access Conduit Box can be rotated for connection from any side. Keyhole slots permit fast and easy removal.

get longer motor life...

WITH GENERAL ELECTRIC TRI 55 CLAD MOTORS

HERE'S WHY: Rigid cast-iron frame and endshields prevent G-E Tri/Clad '55' motors from being twisted out of line—makes machine operation more dependable. Installation of replacement motors is fast and easy because the conduit box can be rotated to any of four directions and because the perma-numbered leads are easy to identify.

THE SMALL SIZE AND LIGHT WEIGHT of Tri/Clad '55' standard dripproof motors facilitates installation of replacement motors. Also, G.E.'s dripproof design allows these motors to be used for many applications which normally require splash-proof type motors . . . you save money.

FOR LONGER MOTOR LIFE, G-E Tri/Clad '55' motors feature Mylar* polyester film insulation, Formex† magnet wire, water-resistant stator coating, and better physical protection.

** Registered Trade-mark of DuPont Co.*

COMPARE G-E Tri/Clad '55' motors with other motor brands. Remember: General Electric offers you a complete line of motors to choose from . . . dripproof and enclosed, vertical or horizontal, C-face or D-flange, and in various electrical designs all of which meet NEMA standards. You'll also be pleased with the ***exceptionally*** fast delivery you can get, and with G.E.'s small motor service station plan which offers you immediate "in-warranty" and "out-of-warranty" repair of motors if the need ever arises.

CONTACT your local G-E Apparatus Distributor now for personal proof of how these G-E motors can save you money, reduce maintenance time, and give you longer-life operation. And ask for your free copy of illustrated bulletins, GEA-5980 and GEA-6602, or send to Section 840-21, General Electric Co., Schenectady 5, N. Y.

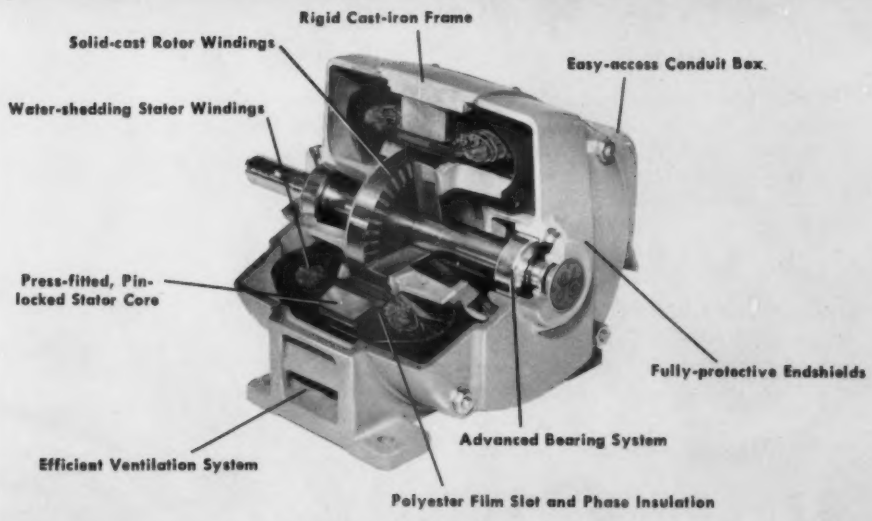
† Registered Trade-mark of General Electric Co.

Progress Is Our Most Important Product

GENERAL ELECTRIC

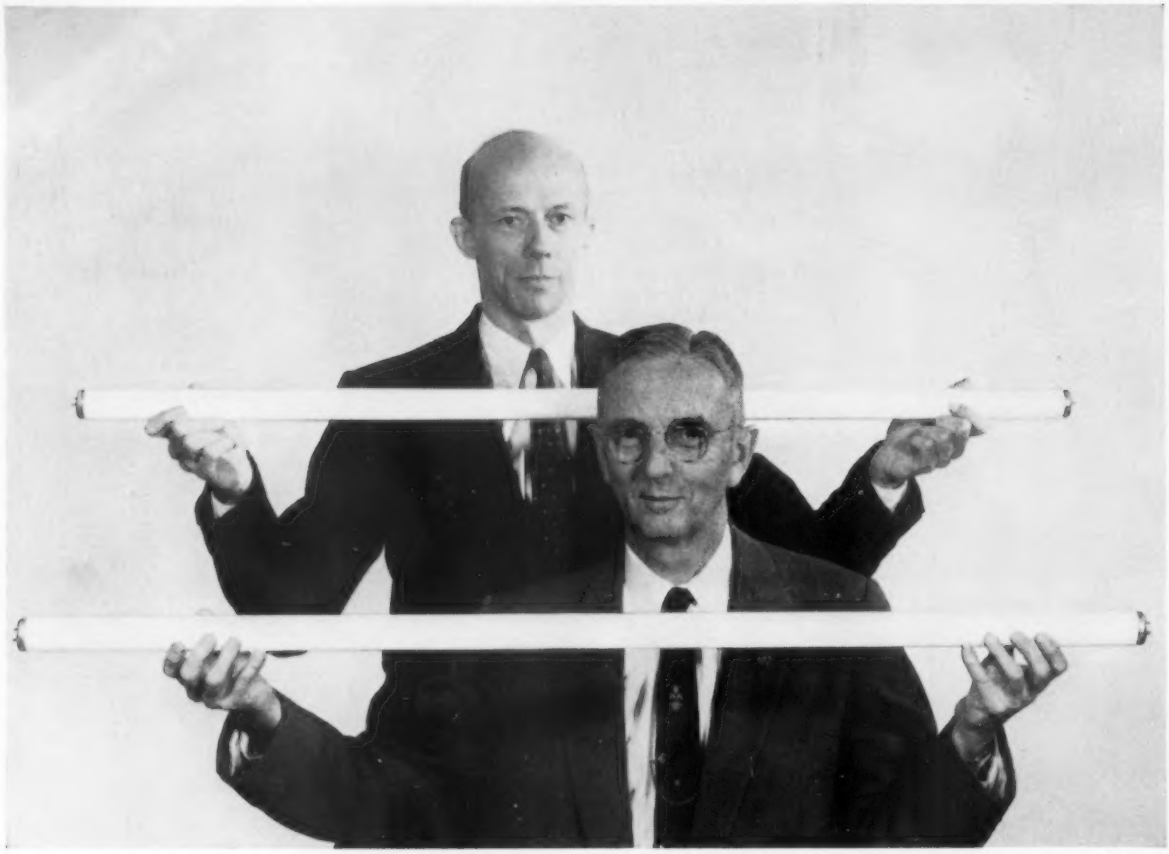
Easy to Clean melamine-paint finish resists rust, corrosion—also provides a good base for repainting later.

GENERAL ELECTRIC TRI 55 CLAD MOTORS OFFER THESE TIME AND MONEY SAVING FEATURES



Standard dripproof Tri/Clad '55' motor

GENERAL ELECTRIC'S 20th FLUORESCENT ANNIVERSARY ANNOUNCEMENT:



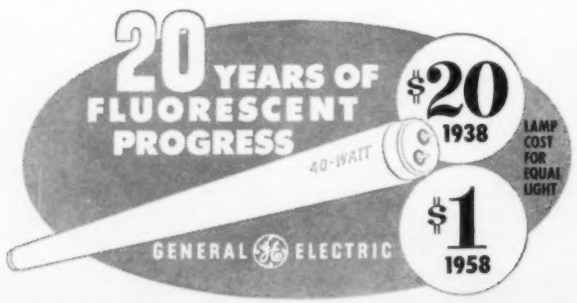
R. N. THAYER (left) AND G. E. INMAN developed first commercial fluorescent lamp in the U.S.A. in 1938. Still with General Electric, they have been key men in many G-E fluorescent lamp improvements.

Today's G-E Fluorescent Lamps give you 76% more light per watt, last 5 times longer... yet cost ½ as much!

The first fluorescent, introduced 20 years ago this month by General Electric, can't hold a candle to today's G-E 40-watt Lamps. A steady stream of improvements from G.E. in Rapid Start and Pre-Heat Lamps has provided up-to-the-minute lighting systems for G-E Lamp users. Efficiency is up 76%, rated life is 5 times longer, and the list price is down 57%! *This means one G-E Fluorescent Lamp dollar today buys as much light as $20 did 20 years ago!*

NEWEST IMPROVEMENT—"BONUS PHOSPHOR". This revolutionary new G-E process gives you 7 to 9% more light by selecting only the bigger, brighter phosphors to be used in G-E Lamps. It is another dollar-and-cents reason why you get more for all your lighting costs with General Electric Lamps.

For more facts on the "Bonus Phosphor" and what it means in saving you capital *and* operating costs, write: General Electric Co., Large Lamp Dept. P E-48, Nela Park, Cleveland 12, Ohio.



Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 553 on Reply Card

For more facts circle 554 on Reply Card

HIGH CAPACITY PACKAGED STEAM GENERATORS

by Foster Wheeler

Series AG-200 extends economy and dependability of FW Packaged Design to over 60,000 lb/hr

To meet the needs of industrial plants for high-capacity Packaged Steam Generators, Foster Wheeler offers units for capacities of 50,000 to 63,000 lb/hr and higher, depending on operating conditions.

A modification of the proven AG-100 design which has provided industry with reliable, economical steam in the range of 10,000 to 50,000 lb/hr, these compact, space-saving units permit more steam capacity in less space than has heretofore been possible. For complete details, write to *Foster Wheeler Corporation, 666 Fifth Avenue, New York 19, N. Y.*

FEATURES:

- Final Steam Temperatures to 840 F
- Design Pressures to 900 psig
- Standard Heat Recovery Arrangements Available
- 42-inch Steam Drum
- Two Burners
- Automatic Controls
- Suitable For Indoor or Outdoor Installation
- Tangent Bare Tube Furnace Side Walls and Roof
- Staggered Boiler Bank Tube Arrangement
- Fully Drainable and Removable Superheater.

THE FOLLOWING AG-200 UNITS ARE NOW IN PRODUCTION:

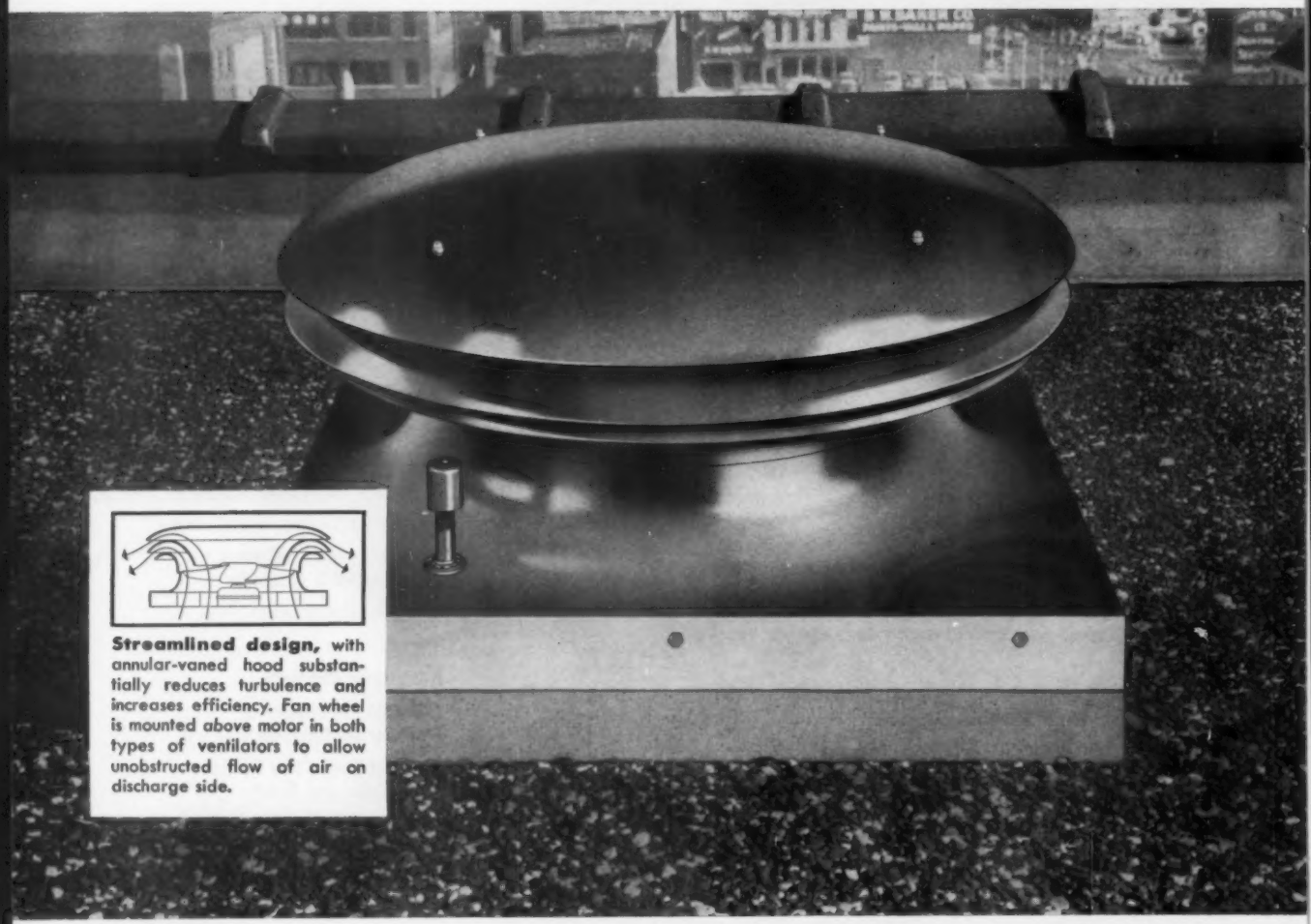
Capacity lb/hr	Operating Pressure psig	Final Steam Temperature Deg. F	Feedwater Temperature Deg. F	Fuel	Efficiency	Steam Quality
52,500	400	750	200	No. 6 Oil	85.5	3 ppm Solids Carryover
60,000	285	Sat.	220	Nat. Gas	78.3	3 ppm Solids Carryover
63,700	150	Sat.	225	No. 6 Oil	83.7	0.5% Moisture Carryover
68,000	620	Sat.	350	No. 6 Oil	80.9	1 ppm Solids Carryover

FOSTER WHEELER

NEW YORK • LONDON • PARIS • ST. CATHARINES, ONT.

For more facts circle 555 on Reply Card

Now! Low cost the Trane Axial

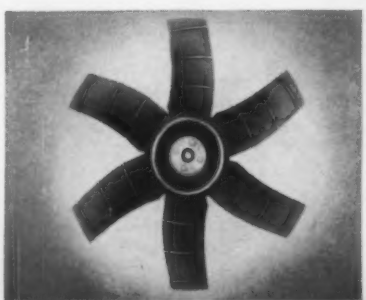


Streamlined design, with annular-vaned hood substantially reduces turbulence and increases efficiency. Fan wheel is mounted above motor in both types of ventilators to allow unobstructed flow of air on discharge side.

Hooded type Axial Roof Ventilator has specially engineered annular turning louvers to reduce pressure loss. May be used for exhaust or summer supply. Meets blackout requirement. Available with three types of positive or gravity dampers.

Vertical exhaust ventilator. This type of new TRANE Axial Roof Ventilator is used to exhaust hot or dirty air. Discharges air straight up, away from roof. Sloping gravity dampers open when fan starts, close when fan stops.

Model B fans—3 or 6 bladed—are furnished with TRANE Axial Roof Ventilators. Fan blades are arc-welded to the spun fan hubs. Stiffeners spot-welded to blades for added reinforcement.



ventilation with Roof Ventilator

New from Trane . . . a low silhouette, high efficiency ventilator that's completely accessible from the roof!

Here's a roof ventilator that will provide economical ventilation for mills, factories, warehouses and all large buildings with open type interiors. It's the new TRANE Axial Roof Ventilator—designed to provide lower silhouette, lower initial cost, low power consumption, complete accessibility from the roof.

Available in two basic types—hooded or vertical exhaust—the new TRANE Axial Roof Ventilators come in five sizes: 24, 30, 36, 42 and 48-inch fan wheel diameter. Models are available to handle corrosive and explosive fumes and gases.

Easy to maintain, these ventilators have easily accessible motors and drive belts; complete assembly pivots for fast service or inspection.

Next time you're planning a factory or commercial ventilation job, make it TRANE! For complete facts, just call your nearby TRANE Sales Office or write TRANE, La Crosse, Wisconsin.

Check these features!

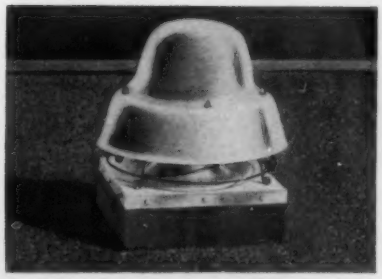
- *AMCA Certified Rating Seal*—Units tested and rated according to the Standard Code of the Air Moving and Conditioning Association (AMCA) and the ASHAE.
- *Low silhouette*—For trim appearance. 24-inch ventilator is only 19 3/16" above roof line.
- *Easy maintenance*—Hood slips off easily for access to motor and belts. Complete assembly pivots. Safety switch on unit permits maintenance man to disconnect fan for service.
- *Quality construction*—All wheels are scientifically balanced. Blades are blanked and die-formed complete with beads to insure permanent set of blade contour. For added reinforcement, stiffening plates are spot-welded to each blade. Motors are totally enclosed.
- *Versatile*—Complete range of five sizes from 24-inch to 48-inch wheel diameter. Two basic types: vertical exhaust, and hooded exhaust or supply. Models available to handle corrosive and explosive fumes and gases.
- *Safe*—Units are available with built-in spring and fusible link to control damper in presence of fire.

For any air condition, turn to

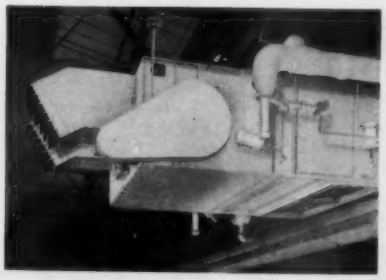
TRANE

MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

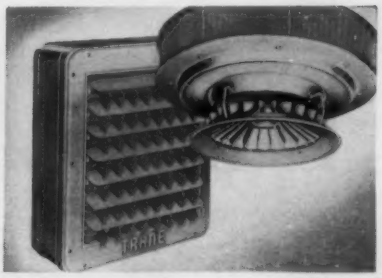
THE TRANE COMPANY, LA CROSSE, WIS. • SCRANTON MFG. DIV., SCRANTON, PA.
TRANE COMPANY OF CANADA, LTD., TORONTO • 96 U.S. AND 19 CANADIAN OFFICES



Centrifugal Roof Ventilator for quiet, high-volume ventilation against higher static pressures. Streamlined, lightweight, compact, easy to install. 16 fan sizes from 7" to 40" wheel.



TRANE Torrivent heats and ventilates large areas. Rugged, efficient centrifugal units handle up to 33,000 cfm. May be installed on floor, ceiling or wall, with or without duct work.



TRANE Unit Heaters—Horizontal or Projection types—put the heat where you want it! Patented diffusion feature gives an unlimited number of heating patterns.

How a Johns-Manville Roof Survey helps . . .

STOP COSTLY ROOFING TROUBLES

Don't take your roof for granted, even though it doesn't seem to be leaking. Winter weather often opens up laps in the roofing, cracks the parapet and coping. Ice and snow can wear and weaken roofing felts and flashings.

To correct roofing defects before they result in costly damage, it pays to have your roof inspected every spring by an expert. Your J-M Roofing Contractor is the man to do it. He will make a complete survey covering all critical areas of the roof. This includes flashings, deck, roofing felts, parapet walls, skylights, ventilators, etc.

This detailed survey is made without obligation. A written report will tell you what defects need immediate attention. This report also points out conditions which should be corrected now to eliminate future trouble.

For free Roof Survey, call your J-M Roofing Contractor. He is listed in the Classified Telephone Directory.

Send today for a copy of booklet "Things You Should Know About Your Roof." It contains information about the J-M Roof Survey Plan. Write: Johns-Manville, Box 158, New York 16, N. Y. In Canada, write 565 Lakeshore Road East, Port Credit, Ont.

JOHNS-MANVILLE

JOHNS-MANVILLE PRODUCTS

For more facts circle 557 on Reply Card

For more facts circle 558 on Reply Card →

Shutdowns for lubrication cut in half with

RYKON

Grease

Dollars in production time saved by using RYKON in high temperature service at Northwestern Steel & Wire Company

Bearings on the 46-inch blooming mill manipulator and side guard carrier had to be lubricated twice each eight-hour shift before RYKON Grease was used. The mill had to be shut down while the lubrication work was performed. Now with RYKON, the bearings are greased once each shift. Maintenance men find rollers and pins are still well lubricated. The rollers are subject to almost constant heat and water washing. Steel blooms heated to approximately 2300° F. are just 18 inches away from the RYKON lubricated bearings. The lubricating properties of the grease are unaffected by the heat.

RYKON Grease delivers similar performance results elsewhere in the plant. In roller bearings on the reheating furnace charging tables, in pinch roll bearings and in other trouble spots, where heat and continuous water washing would make short work of other greases, RYKON stands up to the test.

A unique nonsoap, organic thickening agent gives RYKON Grease the ability to provide lubrication in tough-to-lubricate spots long after other greases have failed. This thickener is the result of five years of research effort by a Standard Oil grease research team working to develop an outstanding industrial grease. RYKON Grease is a true multipurpose grease capable of performing all lubrication jobs on one piece of equipment or often in an entire plant.

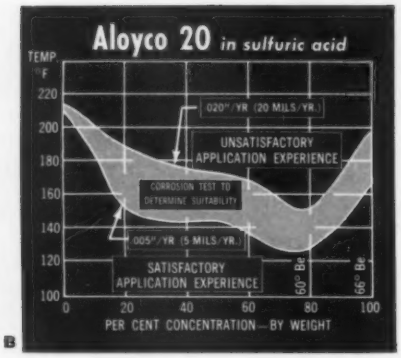
More facts about RYKON Grease are available from the Standard Oil lubrication specialist that is near you in any of the 15 Midwest and Rocky Mountain states. Call him. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

You expect more from **STANDARD** and get it!

Lubrication time cut. Mill feeder pinch roll bearings formerly lubricated twice each eight hours. Now with RYKON Grease, lubrication is needed only once each shift. Elbert Dean, Northwestern Steel lubrication engineer, and Standard Oil lubrication specialist, Charles Daub, inspect bearings. Counseling people who have lubrication jobs like this is work for which Chuck Daub is well-qualified. Chuck has 12 years' experience in lubrication technical service work. He has an engineering degree from Illinois Institute of Technology and has completed the fifteen week Standard Oil Sales Engineering School course.

Quick facts about
RYKON Grease

- Stable at high temperatures. At sustained high temperatures RYKON Grease remains soft and grease-like.
- Resistant to water washing.
- Mechanically stable. Minimum change in consistency in service.
- Resistant to oxidation. Thickener acts as an inhibitor.
- Exceptional rust preventive properties.



B

A

C

D

A. Your Problem in handling corrosives is discussed with a specialist when you sit down with an Aloyco Sales Engineer. He handles only one line, knows his business.

B. Right Alloy for your application is based on 29 years of specialized experience in the field plus continuing research in Aloyco metallurgical labs.

C. Valve Casting is made from Aloyco design in Aloyco foundry, only foundry ever built to produce pressure-tight Stainless Steel Valve castings, exclusively.

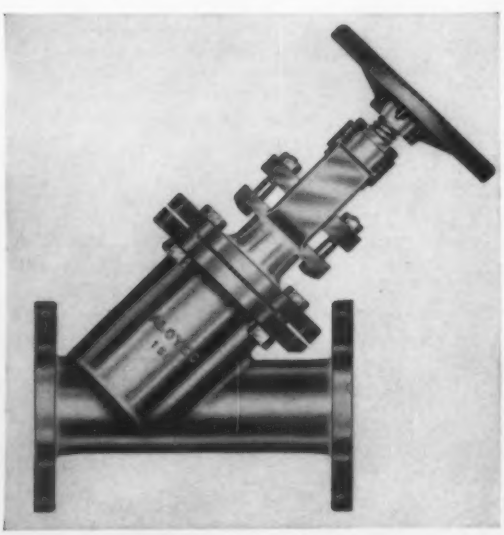
D. Special Techniques in machining stainless steel, plus most modern equipment in Aloyco plant assure you precise tolerances, trouble-free performance.

E. Aloyco Y Valve, shown here in various stages of production, is one of Aloyco's complete line of valve types, alloys, sizes, pressures—including nuclear valves.

BEHIND EVERY ALOYCO VALVE...

specialization

... to help you handle corrosives



E

Valves often look alike—even stainless steel valves. But they won't necessarily perform alike when you get them into the line.

Here are some of the special skills and facilities that make the difference between Aloyco valves and others. Some of the "extras" you get with Aloyco valves are staying power, minimum maintenance, trouble-free operation in severe as well as mild corrosive service. Doesn't it make sense that the one company specializing in the manufacture of Stainless Steel Valves exclusively is your best source of supply?

B.2

ALLOY STEEL PRODUCTS COMPANY

1308 West Elizabeth Avenue, Linden, New Jersey

For more facts circle 559 on Reply Card

CONSTRUCTION BRIEFS —a review of fundamentals for the plant engineer

Prepared by B. A. Wasil, Structural Engineer

DESIGNING IN REINFORCED CONCRETE PART III

IN THE preceding two Briefs, the methods for the design of concrete mixes were established. Beginning with this Brief, the fundamentals of reinforced concrete design will be reviewed.

Reinforced concrete is made up of two materials (concrete and steel) which have different elastic characteristics. Concrete is an effective material in resisting compression stresses, but is very poor in tension.

The elastic properties of steel and concrete can best be indicated by typical stress-strain curves. Figure 1 shows such a curve for concrete. On the graph, f'_c is the ultimate compressive stress of a six-inch-diameter, twelve-inch-deep concrete cylinder, tested in a prescribed manner. Note that the stress-strain relationship is parabolic rather than a straight line; however, for the portion up to the allowable working stress, f_c, the stress-strain curve can be approximated by a straight line. In accordance with the American Concrete Institute's "Building Code Requirements for Reinforced Concrete" the value of the elastic modulus can be approximated for design purposes as $E_c = 1000\ f'_c$. Also in accordance with the ACI building code, the allowable stress in compression is $f_c = 0.45\ f'_c$.

Figure 2 shows the stress-strain curve for mild steel in tension. Here, f_y is the yield stress of the steel and f_s is the allowable working stress of steel in tension. This value is 20,000 psi for rail steel, billet steel of intermediate and hard grades, axle steel of intermediate and hard grades, and cold-drawn steel wire reinforcing bars. For billet steel of structural grade and axle steel of structural grade reinforcing bars, f_s is 18,000 psi. For all steel reinforcing bars, E_s is 30,000,000 psi.

Standard rolled reinforcing bars are designated by a code number. They are ordinarily deformed to create high bond characteristics with the concrete.

It will also be important to know the ratio of E_s/E_c. This value is known as "n". From Table I and the fact that E_s is always considered equal to 30,000,000 psi, Table II is derived.

It will be recalled that the basic assumptions for the development of the theory of flexure for homogeneous materials are:

1. Planes perpendicular to the neutral axis before bending remain plane and perpendicular to the neutral axis after bending;
2. Stress is proportional to strain.

These assumptions are basic to shallow beam small deflection theory. These assumptions are also used in theory of flexure for reinforced concrete. However, two additional assumptions are necessary:

3. Concrete resists no tension;
4. Perfect bond exists between concrete and steel.

With these assumptions and the theories of static equilibrium, we can develop the theories for reinforced concrete.

Figure 3 shows the strain and stress distribution across a section of a rectangular reinforced concrete beam. Due to assumption 1, the strain varies linearly from a contraction at the top to an extension on the bottom, becoming zero at the neutral axis. From assumption 2, the concrete stress on the compression side will also vary linearly from a maximum on the top fibers to zero at the neutral axis. From assumption 3, there will be no tension resistance until the stress reaches the

NOMENCLATURE

- b Width of rectangular flexural member
- d Depth from compression face to center of reinforcement
- j Ratio of distance between centroid of compression and centroid of tension to the depth d
- k Ratio of distance from extreme compressive fiber to neutral axis to the depth d
- M External bending moment
- R Constant for flexural computations
- Σ_p Sum of tensile stresses
- T Resultant of tensile stresses
- u Bond stress per unit of surface area of bar
- V Total shear
- v Shearing unit stress

Table I. Modulus of elasticity and allowable compressive stresses in concrete

f'_c (psi)	f_c (psi)	E_c (psi)
2000	900	2,000,000
2500	1125	2,500,000
3000	1350	3,000,000
3750	1688	3,750,000
5000	2250	5,000,000

Table II. Concrete strength, related to n

f'_c	n	f'_c	n
2000	15	3750	8
2500	12	5000	6
3000	10		

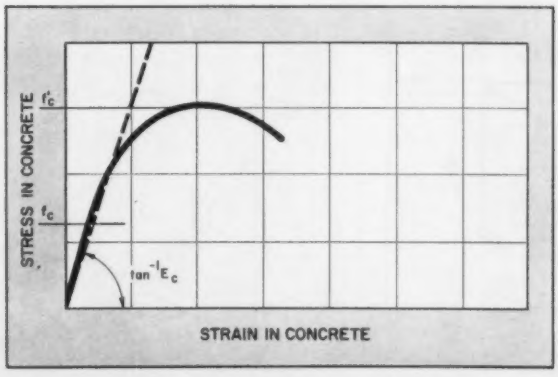


Fig. 1. Typical stress-strain curve, concrete in compression

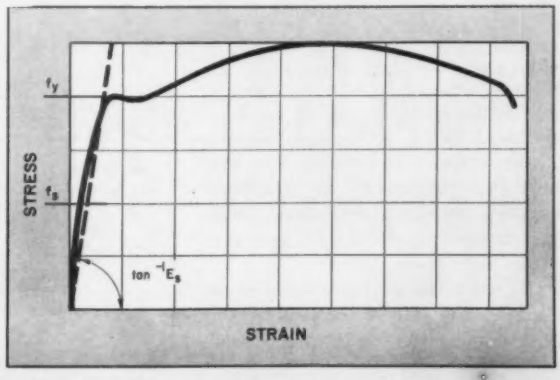


Fig. 2. Typical stress-strain curve for mild steel in tension

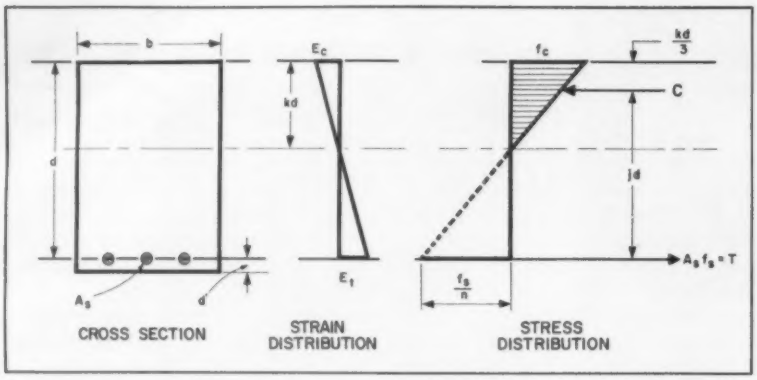


Fig. 3. Method of analysis of a rectangular concrete beam using theory of flexure

steel, which alone will resist all tension. By extending the stress line to the steel and applying assumptions 4 and 2, we can reason that the stress in the concrete at the steel layer would be f_s/n. From this figure we can develop the equations for the design in flexure.

By similar triangles, we note that:

$$\frac{kd}{d} = \frac{f_c}{f_c + \frac{f_s}{n}}; \text{ or } k = \frac{f_c}{f_c + \frac{f_s}{n}} \quad (1)$$

$$\text{Also, } jd = d - \frac{kd}{3}; \text{ or } j = 1 - \frac{k}{3}$$

$$C = \tfrac{1}{2} f_c kdb \quad (2)$$

The moment resistance of this cross-section is equal to the internal moment:

$$Cjd = Tjd.$$
$$\text{Thus } M = \tfrac{1}{2} f_c kbjd^2$$
$$\text{If we define } R = \tfrac{1}{2} f_c kj, \quad (3)$$
$$\text{then } bd^2 = M/R \quad (4)$$
$$\text{Also, because } M = Tjd,$$
$$A_s = M/f_s jd \quad (5)$$

Equations 1, 2 and 3 are called the design constants for a rectangular balanced beam. Equations 4 and 5 are the first two design equations in flexure. It seems efficient to have the extreme concrete stress at its allowable stress for the same moment that the steel is at its allowable stress. When this is so, we have a balanced beam. For particular values of f_c, f_s and n, we note that k, j and R are constant values.

We know that bending also creates shearing stresses; for reinforced concrete, bending will create bonding stresses between steel and concrete.

Figure 4 shows a free body of the compression side of the neutral axis of a section removed from a beam in bending. Since the moment varies along the length of the beam, the moment on each face of the free body will be slightly different. This difference we will call $\triangle M$.

$$C_2 - C_1 = \frac{\triangle M}{jd}$$

If v is considered the unit horizontal shear at the neutral plane, then:

$$C_2 - C_1 = vb\triangle x$$
$$\frac{\triangle M}{jd} = vb\triangle x$$
$$bd = \frac{\frac{\triangle M}{\triangle x}}{vj}$$

But the rate of change of moment is equal to the total shear, thus:

$$bd = \frac{V}{vj} \quad (6)$$

Now, if we examine Fig. 5 we note that since there is a variation in the forces T_2 and T_1, bonding stresses will develop along the surface of the steel bars, to resist slipping. If u is considered the bonding stress and Σ_0 the sum of the perimeters of the bars, then:

$$T_2 - T_1 = u\Sigma_0\triangle x$$

$$\text{But again } T_2 - T_1 = \frac{\triangle M}{jd}$$

$$\text{and } \Sigma_0 = \frac{\frac{\triangle M}{\triangle x}}{ujd}$$

$$\text{Thus } \Sigma_0 = \frac{V}{ujd} \quad (7)$$

With concrete, we are aware that tension plays a critical role. We also know that when shear occurs, we have an equal intensity principal tension at 45 deg to the shear. Whenever shear, and thus diagonal tension, exceeds a given allowable value, a beam must be protected against failure by the use of stirrups. These are usually U-shaped bars with hooks on each end, spaced vertically in beam according to spacing equation:

$$S = \frac{f_s A_s}{v'b} \quad (8)$$

$$\text{where } v' = v - v_c$$

v is the computed shearing stress at the place where the spacing is required and v_c is the specified diagonal tension allowed.

Reviewing the design equations, we note that:

Equation 4 is concerned with compression; Equation 5 is concerned with tension; Equation 6 is concerned with shear; Equation 7 is concerned with bond.

No design problem in reinforced concrete is complete unless each of the four stresses is checked to see that it does not exceed the allowable values. We also note that equations 4 and 6 refer to the dimensions of the concrete while equations 5 and 7 deal with the area and perimeter of the reinforcing steel.

In the Briefs to follow, the equations developed here will be applied to practical problems in the design of slabs, beams and footings.

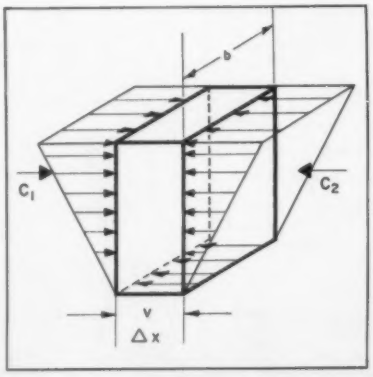


Fig. 4. Shearing stresses at neutral axis

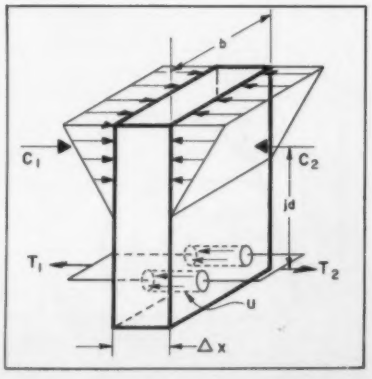
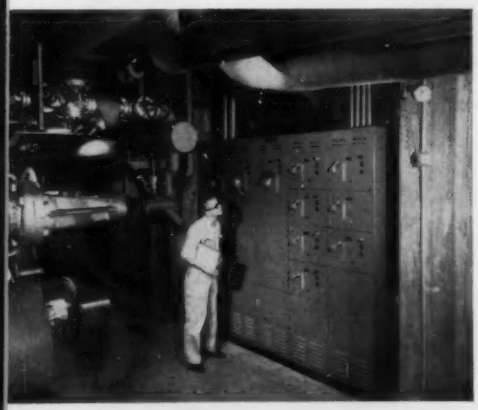


Fig. 5. Bonding stresses, reinforced beam

Cardinal Glennon Memorial Hospital for Children, St. Louis, Mo., occupies 4½ acres, employed 4,000,000 man-hours of labor in a three-year construction period.

One of two Westinghouse motor control centers with Type B wiring installed in hospital. Each starter has 480- to 110-volt individual control transformer for controlled circuit. J-94111-1



Fail-proof electrical system for children's hospital supplied by Westinghouse

YOU CAN BE SURE...IF IT'S Westinghouse

All-Westinghouse electrical distribution system was unanimous choice for long-term service

J-94111-2

Hospital conference room scene includes Norman H. Maas, Electrical Engineer for Maguolo and Quick, Architect; Joseph F. Dwyer, Manager of Hospital's Central Office and Coordinator of Building Committee; Sister Mary Vivian, S.S.M., Director of Occupational Therapy; Louis S. Sachs, S. C. Sachs Co., Inc., Electrical Contractor; (standing) W. L. Phiffer, Westinghouse Construction Sales Engineer; Paul Olschner, Westinghouse Area Sales Manager; and Walter R. Riechman, Westinghouse Electric Supply Co.

Selection of all-Westinghouse equipment for the electrical distribution system of the Cardinal Glennon Memorial Hospital for Children was made only after the many exacting requirements for hospital service were established and analyzed. The success with which the requirements are being met is shown in the quotes which follow:

The hospital manager reports, "During the 1½ years we have been in operation, the electrical distribution system has required no maintenance other than a periodic check by Westinghouse engineers. Inasmuch as this equipment was furnished by one manufacturer, we have the advantage of undivided responsibility along with a minimum parts inventory stock."

The electrical contractor adds, "The extensive cooperation by Westinghouse in scheduling shipments and in arranging larger shipments to facilitate handling provided us with the optimum flexibility we needed for the three-year construction period."

(continued)

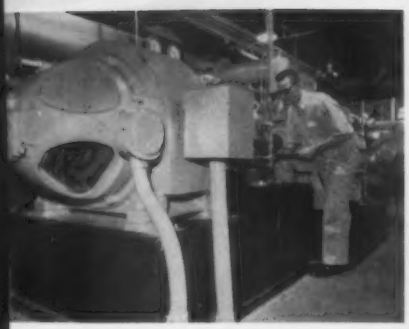
YOU CAN BE SURE...IF IT'S Westinghouse

Engineers and contractors discuss Westinghouse metal-clad 5-kv indoor switchgear employing preferred-emergency incoming line transfer arrangement.

Westinghouse Type NLAB Quicklag® breaker lighting panelboards. A total of 42 lighting panelboards and 10 power distribution panelboards are installed in hospital.

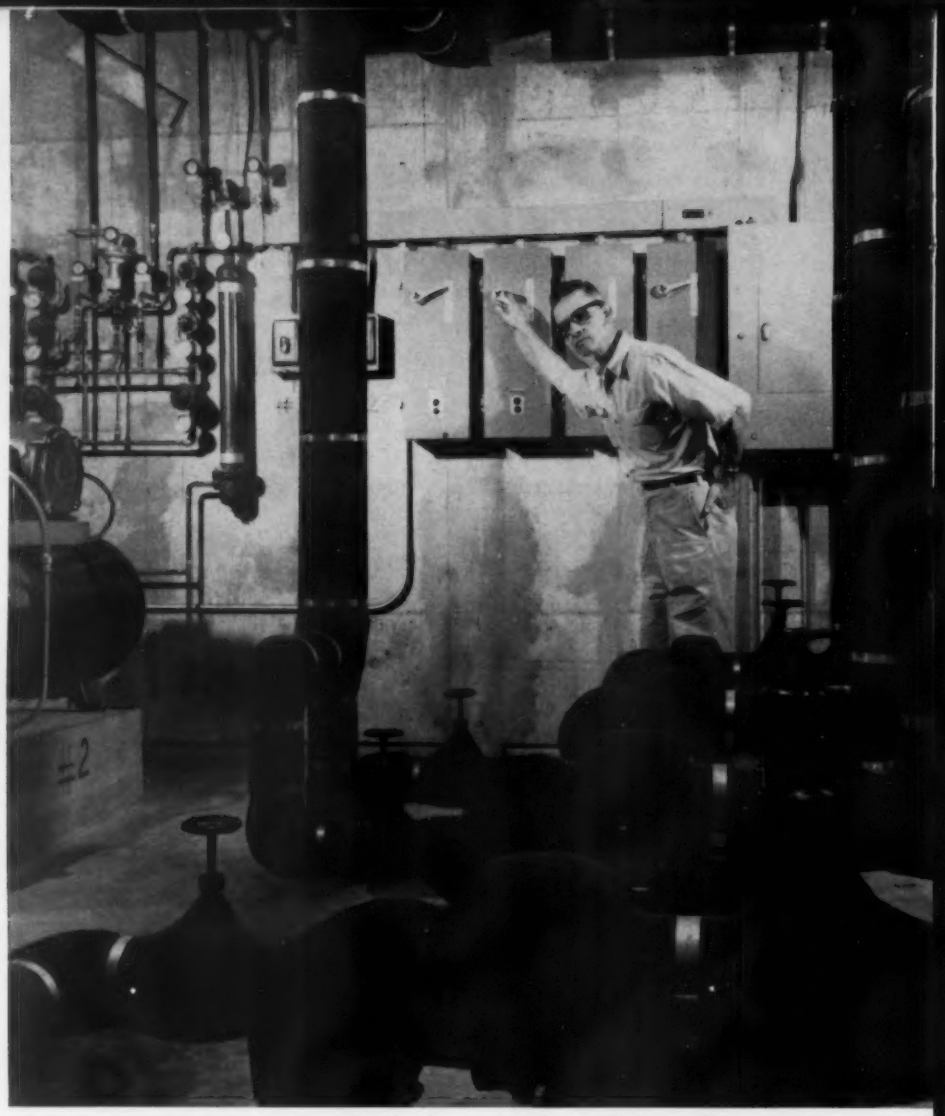
Transformer room close-up shows three of hospital's five Westinghouse dry-type self-contained power centers. 75-kva 208-volt wye to 120-volt delta ungrounded insulating power center is in foreground, and two 225-kva power centers are at rear.

J-94111-3



View of components in air conditioning compressor hook-up. In foreground is a Westinghouse 250-hp wound-rotor induction motor with Type SU double-helical-type speed increaser—1760 to 6750 rpm.

The Cardinal Glennon Memorial Hospital cares for children between the ages of one to twelve, regardless of race, color or creed.



Individual protection of vacuum pumps is provided by Westinghouse Class 11-204, Size 1 starters in NEMA 1 enclosures.

All-Westinghouse system unanimous choice for long-term service *(continued)*

The architect-engineering firm, reviewing the design and engineering which went into the hospital, says, "Our design criteria for the building was established at 100 years, and we selected all material and equipment on that basis. Because of the critical demand for absolute reliability on the electrical system in a hospital of this type, our first consideration was the duplicate primary service, with each 5000-volt feeder from a separate substation as a power failure safety factor. Our past experience with Westinghouse in working out this particular kind of transfer system in conjunction with their application engineers gave us the proved dependability we needed."

Details of some of the Westinghouse equipment used in the Cardinal Glennon Hospital are illustrated on these pages. Additional information about how Westinghouse helped meet the electrical needs of this hospital is available. Information is also offered in helping you solve your own electrical requirements. See the Westinghouse electrical construction engineer nearest you or write Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pennsylvania.

Cardinal Glennon Memorial Hospital for Children
Architect-Engineer: Maguolo and Quick
Electrical Contractor: S. C. Sachs Company, Inc.
General Contractor: John B. Gutman Construction Company
Westinghouse Distributor: Westinghouse Electric Supply Company

J-94111-4

YOU CAN BE SURE...IF IT'S Westinghouse

Over 250 Pages
Westinghouse Data
in Sweet's Construction File

For more facts circle 560 on Reply Card

Penetrates through rust
like coffee soaks into a sugar cube!

How much do you spend on removing rust before you paint? Why not coat right over the sound rusted metal with Rust-Oleum 769 Damp-Proof Red Primer after simple scraping and wire-brushing to remove rust scale and loose rust... saving time, money, and metal! Rust-Oleum's specially-processed fish oil vehicle penetrates* through rust to bare metal—while the surface film remains *tough, firm,* and *durable.* You cut costly surface preparations, you receive nearly 30% greater coverage depending upon the condition and porosity of the surface—and you receive the *maximum* in over-the-years protection!

Whatever your color choice may be—Rust-Oleum finish coatings include the color you want. They're manufactured under the same *exclusive* formulation as the Rust-Oleum Primer . . . they assure you of *greater* compatibility, *double* protection, and *lasting* beauty! The best way to see what Rust-Oleum will do for you is to actually try it yourself . . . around your plant or home.

See our complete catalog in Sweets, or send the coupon for a free Rust-Oleum Test Sample . . . one brushful means *more* than a thousand words. Prompt delivery from Industrial Distributor stocks.

*As proved by Battelle Memorial Institute Technologists in radioactive tracing studies.

RUST-OLEUM®

Distinctive as your own fingerprint. Accept no substitute.

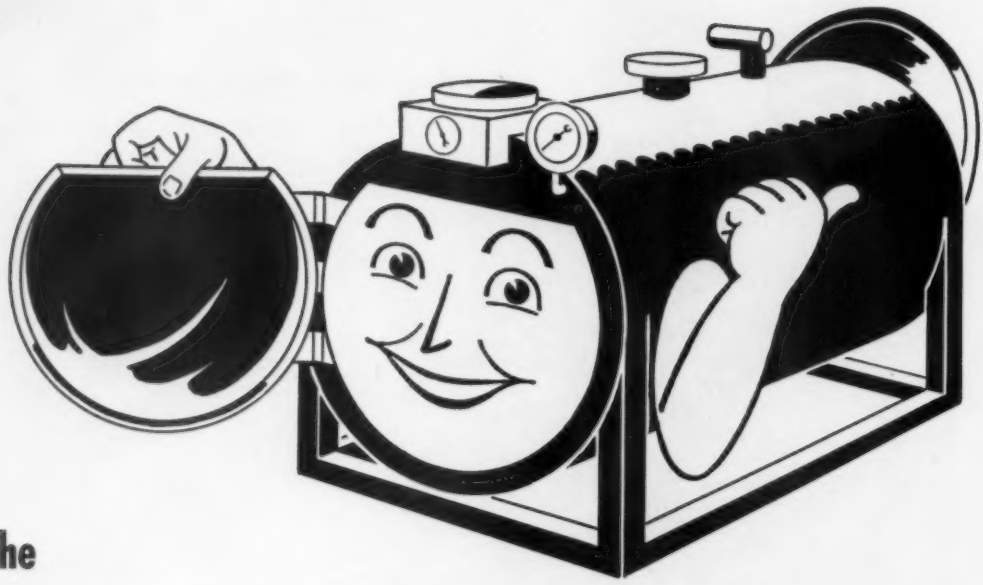
STOPS RUST!®

ATTACH TO YOUR LETTERHEAD FOR FREE TEST SAMPLE!

RUST-OLEUM CORPORATION
2535 Oakton Street
Evanston, Illinois

- ☐ Free test sample with complete literature
- ☐ 30-page report on Rust-Oleum penetration
- ☐ Nearest source of supply

For more facts circle 561 on Reply Card



The Boiler that doesn't show its age

The practical, two-pass design of the Continental Automatic Boiler is a long-life feature that cuts operation and maintenance cost. The hinged doors – front and back – open on the burner. No baffles or partitions that can be damaged in routine servicing. No take-out, put-back refractories.

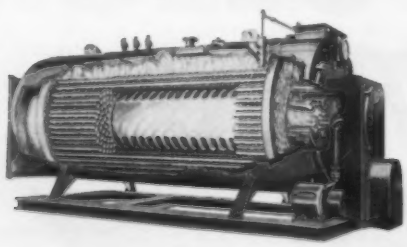
Continental's exclusive "spinning gas" technique heats all return tubes fully and evenly in just two passes, assuring longer service life. Free, rapid water circulation improves heat transfer and keeps heating surfaces clean.

Low maintenance is just one of the cost-saving features of the Continental Automatic Boiler. Every Continental is fire-tested and guaranteed for better than 80% efficiency. Owners report fuel savings up to 33% . . . and Continental efficiency stays constant over a wide load range and a long service life.

Continental Boiler Service, available from coast to coast, includes aid and supervision in start-up, operating instruction for attendants, competent and dependable service when needed. See your service-minded Continental Boiler representative or write for Bulletin BE-3.

BOILER ENGINEERING & SUPPLY COMPANY, INC.
2 Manavon Street, Phoenixville, Pa.

The **Continental** AUTOMATIC BOILER



Cut-away view of typical Series A Continental Automatic Boiler, firing oil and/or gas. Other models from 20 to 500 hp, with on-off, low-high-low or modulating controls. For steam heating or process work at pressures from 15 to 250 pounds, or for hot water heating at low or high temperatures.

A HALF CENTURY OF BOILER MANUFACTURING EXPERIENCE

For more facts circle 562 on Reply Card

INVINCIBLE
WELDING FLUX RECOVERY SYSTEMS

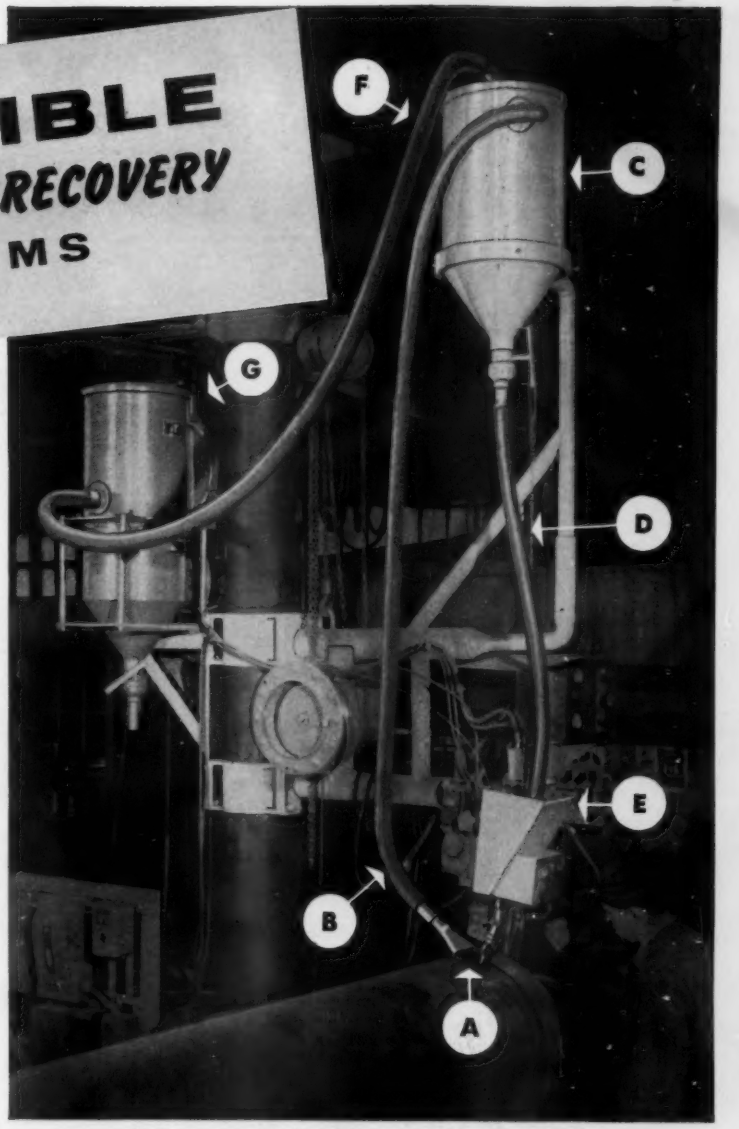


Photo courtesy of Northern Power and Industrial Piping, Ltd., Toronto

Reclaim Flux Automatically . . . Give Big Return on Investment

By using Invincible Systems on submerged arc welding jobs, one manufacturer salvages 100 pounds of flux daily; another reclaims $400 worth each day. Value of the material alone paid for the units within a few weeks.

Invincible units, like that in the photo, recover all unfused flux, remove powder and return slag-free, dust-free flux to the welder in a *continuous flow.*

Recovering flux is only part of the story. Invincibles also save costly manhours over manual methods, speed production and minimize expensive rejects by eliminating flux flour.

Invincibles are available in a wide variety of automatic and manual models. Compact, and highly flexible, they can be fitted to your specific operations, eliminating the need for costly tailor-made installations. Engineered to resist the abrasive nature of flux, Invincibles are ruggedly built for heavy-duty service.

Automatic operation of this Invincible makes possible complete recovery of unfused flux from circumferential butt weld operation. Here is how it works:

A. Nozzle draws flux up from work.

B. Recovery Hose.

C. Primary Separator separates usable flux from slag and fine dust.

D. Return Hose.

E. Flux returned into Hopper of welding head.

F. Hose connects Primary Separator (c) to Vacuum Producer (g).

G. Invincible Vacuum Producer provides vacuum for entire system and draws off the fines.

WRITE TODAY FOR FOLDER
giving full information on all types of Invincible Flux Recovery Systems.

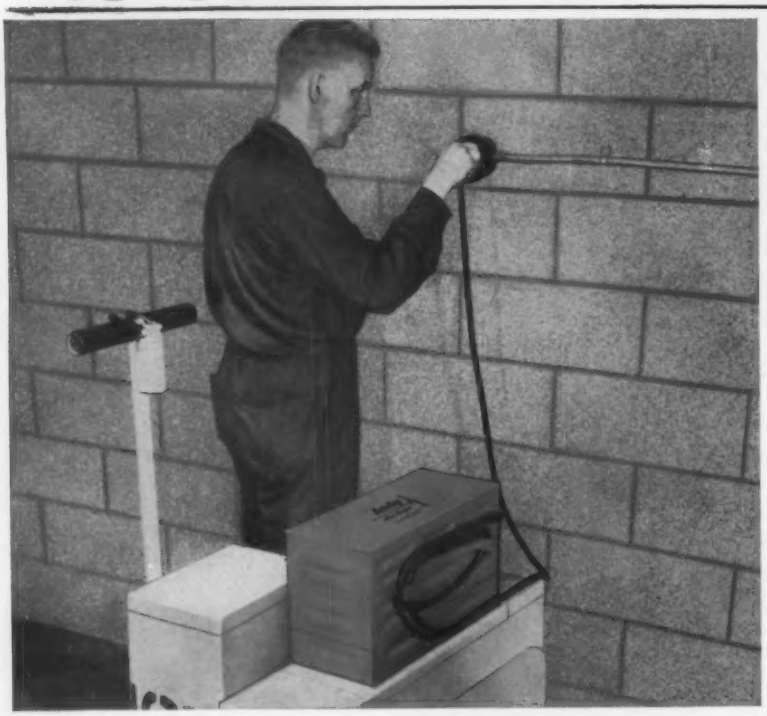
INVINCIBLE

VACUUM CLEANER MFG. CO.
DOVER, OHIO
OVER 50 YEARS THE LEADER IN INDUSTRIAL VACUUM EQUIPMENT

For more facts circle 563 on Reply Card

(Advertisement)

NEW TRUCK BATTERY CHARGER IS COMPLETELY AUTOMATIC



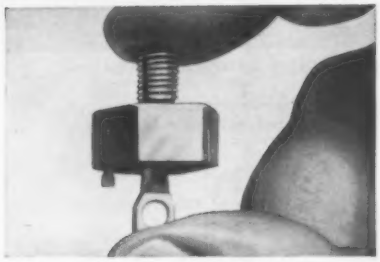
C & D BATTERIES, INC. BRINGS OUT NEW LINE OF *AutoReg* * SILICON CHARGERS

Two new, single-phase, constant d-c voltage silicon rectifier battery chargers have been introduced by C&D BATTERIES, INC., manufacturers of *Slyver-Clad*® industrial truck batteries. The new chargers, called *AutoReg**, allow plants, warehouses, and shippers to take advantage of the latest materials handling methods without having to rewire their electrical power facilities.

The compact chargers plug into any standard single-phase, 15-ampere, 60-cycle, 115 volt convenience outlet. The smaller model charges any 6-cell lead-acid hand truck battery with a capacity ranging up to 450 ampere hours. The other model charges 6-cell batteries with a capacity ranging up to 660 ampere hours.

* Trademark

Uses New Silicon Rectifier



Heart of the new charger is a silicon rectifier. It has no known aging characteristics and thus eliminates aging taps. This means adjustments to the charger after being in use for some time are not required.

The inherent design of the charger prevents harmful overcharging. Turning a simple, synchronous timer mechanism places the charger in operation and automatically takes the unit off the a-c line in 16 hours or less.

Convection cooled, the new line of C & D *AutoReg* chargers require no maintenance. A direct short circuit across the output terminals merely causes the voltage to drop to zero. Flow of reverse current from the battery when a-c power is off is prevented by the silicon rectifying element itself.

CAN BE WALL MOUNTED

The new chargers are small, compact and only a fraction of the size of conventional charging equipment. They can be wall mounted near any standard convenience outlet, or mounted directly on top of a C & D 12-volt truck battery. To charge, simply plug the battery into the charger, then plug the a-c leads into the outlet and set the timer. D-C voltage output is held constant over a ± 10% variation in a-c input.

Literature Available. Complete details on the New C & D *AutoReg Silicon Chargers* are given in Bulletin AR-100/58. Write for Your Copy Today.

C&D *AutoReg** *Silicon Chargers*

A PRODUCT OF C & D BATTERIES, INC. OF CONSHOHOCKEN, PA. . . . ATTICA, IND.

MANUFACTURERS OF *Slyver-Clad*® INDUSTRIAL BATTERIES

PLASTICAL® AND PLASTICELL BATTERIES FOR COMMUNICATIONS, CONTROL AND AUXILIARY POWER

For more facts circle 564 on Reply Card

What's Just Ahead in This Issue?

MOVING parts-in-process from machine to machine can be slow and inefficient or fast and efficient depending on the equipment used. There is a variety of materials handling tools which can be employed to keep the parts moving in an even, smooth stream. Some of them are described in the article beginning on the next page.

WHEN it comes to controlling the work of outside maintenance contractors how do you 1. Make certain you have the right firm to do the job? 2. Determine just what he will do and what it will cost? 3. Eliminate unnecessary call-ins? To see how one company is achieving close control of its contracted maintenance jobs, read the article starting on page 95.

SPACE frame, yokes, V-struts, "umbrella" roof—these are all part of Texas Instruments' new plant. The building is an example of a "different" approach to the design of an industrial structure. The location of its utility lines, equipment, ducts and the inclusion of two "in-plant" gardens along with other features make this plant unusual. For an insight on building details, turn to the article beginning on page 99.

IF YOURS is a big plant with big areas to be heated, it might pay you to look into the economies of high temperature hot water, or HTHW as it is called by those on a first-name basis. You'll find a description of the system as installed in one large plant with some of the reasons why this system was chosen on page 114.

CRANES in two plants of one firm were operating without standby d-c power and corrective action was taken. New equipment was teamed up with old to bring about solutions for both plants. For a briefing on how the overall job was handled, refer to page 122.

WHEN a plant needs a lot of water and the only way to get it is from a deep well, the question of a suitable pump must arise. The Aircraft Div. of Ford Motor Company chose a submersible pump for a 1565-ft deep well which supplies them with water at the rate of 1200 gpm. To find out why, read the article on page 126.

IS YOUR drafting room properly lighted? There are many factors to consider, such as size, contrast and brightness. These along with other considerations to help you select the right lighting for your drafting room are covered in the article beginning on page 128.

Fig. 1. Use of a pneumatic intake hose at the porcelain plant of Westinghouse Electric Corp., Derry, Pa., simplifies the job of unloading dry bulk material from box cars. The unit sucks up as much as 10 tons in an hour

Machine-to-Machine Parts Handling

Here Are Various Ways To Make Each Move Count

By A. T. GAUDREAU, Consultant, Gaud-Reau Associates

WHETHER THE material is received in railcars, highway trailers, or marine bottoms, the initial handling problem at a plant is to unload the carrier and place the material in storage, or charge it into the process system. Such handling problems can be solved by employing one of a number of methods available in industry.

Moving Bulk Material To Storage or Processing

A comparatively efficient, mechanized method for unloading dry bulk material from box cars and charging it into a porcelain plant's processing system is illustrated in Fig. 1. The giant pneumatic nozzle in this application sucks up as much as 10 tons of powdery flint, feldspar, or clay an hour.

This represents a speed which is fully three times the amount of material that could be moved in the same period by manual shoveling onto conveyor belts. The pneumatic system used here carries the material to the tops of huge storage bins or silos fitted with hoppers on the bottom. Trap-doors under the hoppers permit the gravity transfer of dry porcelain ingredients to the mixing vats.

What happens to powdery bulk material after it gets inside the plant is illustrated in the isometric sketch in Fig. 2 for a cake-flour process in a food plant. The problem here is to move and mix flour traveling between two floors in a sequence of operations.

The interfloor movement of cake flour through this processing machinery is made by means of the en-masse conveyor-elevator system. Once the flour has been charged into the hopper on the upper floor, no manual handling takes place until the finished mix is delivered to the packaging operation on the lower floor.

Automatic Unloading and Dispatching of Work

For the handling of work in process in its movement between operations on different machines, whether in the same department or in adjacent departments and floors, a number of unloading and transfer devices have been designed to mechanize these work movements. The functions of these devices begin at the point where the processing operation on a given machine has been completed, and the work is ready to

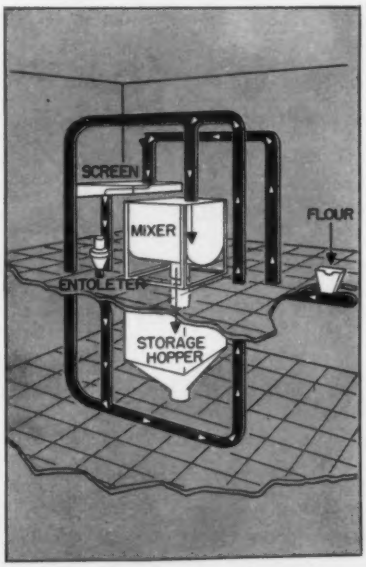


Fig. 2. Schematic shows interfloor flour movement by conveyor-elevator system

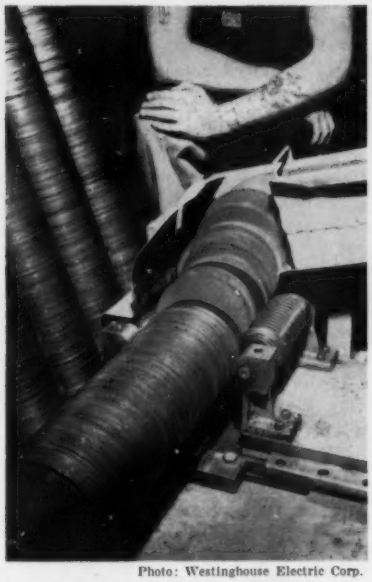


Photo: Westinghouse Electric Corp.

Fig. 3. This shop-designed device stacks punchings as they roll down the chute

Photo: Westinghouse Electric Corp.

Fig. 4. Chute-rack permits gravity delivery of motor frames between work stations. Pneumatic table lifts frame rings to operator's stand and returns for more

be removed and transferred to another machine operation.

Mechanical unloaders or "fingers" are available in the metalworking industry for automatically removing work from such machines as presses, shears, brakes and welders. These unloader attachments are usually mounted on the machines. After a forming or shearing operation has been completed on a machine, the unloader automatically reaches into the die and grasps the stamping. It lifts the stamping out of the die and swings it away from the machine, deposits it on a conveyor or table, and returns to its original suspended position to await the next piece to be removed. This unloader will handle stampings weighing up to 100 lb.

For small-sized stampings and punchings, a number of homemade attachments have been designed by plant personnel for automatic unloading and dispatching of work from a machine. Such a device is illustrated in Fig. 3 for the automatic stacking of punchings as they roll down a chute from the press. The chute feeds the punchings into the screw threads of the automatic stacking device. The screws rotate and move the punchings along the trough to form a horizontal stack which is eventually upended into a vertical position.

Outside the metalworking industry, a number of mechanical devices have likewise been developed for the handling of work between operations. In the laundry industry, for example, automatic spreaders are used for flattening large linen sheets on their way to ironing machines.

Photo: Mechanical Handling Systems, Inc.

Fig. 5. Parts in process are conveyed from one press to another by these inclined flight conveyors and gravity chutes which connect a continuous row of presses

Inter-Station Delivery of Work By Chutes and Feed Conveyors

In delivering work in process from one machine or work station to another, much of the handling is often done automatically by gravity through the use of gravity chutes. A case in point is the chute-rack delivering motor frames between work stations as illustrated in Fig. 4. Fed by a rolling machine outside extreme right of this picture, the motor frames enter on top deck of chute-rack and roll down the incline by gravity towards backboard in center. They then drop down to the

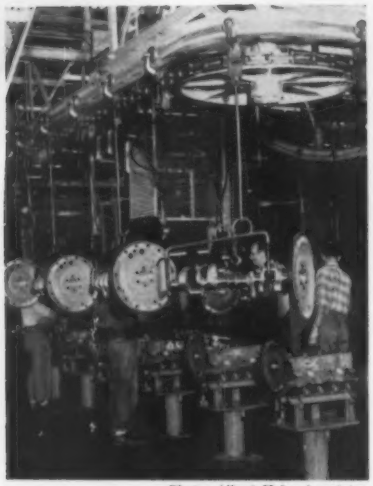


Photo: Albert Kahn Associates

Fig. 6. Overhead chain conveyor at Buick plant, Flint, Mich., feeds engine-block flywheels, at work level, to line

second-level incline and roll in the opposite direction, and finally down to the bottom-level incline towards the operator. At this point they enter a pneumatic lift which delivers them at bench height to the operator at the seam welder station.

Warehouses likewise make use of gravity chutes for moving merchandise from one location to another, particularly from one floor to one or more floors below it. Many installations consist of an inclined conveyor which moves incoming packages upstairs to a second-floor storage and packaging area. Outgoing packages from the second floor slide down a gravity chute to a shipping, collection table.

Automatic Transfer of Work Between Operations

Moving fabricated parts mechanically from machine to machine without manual rehandling between operations, is considered to be but one step removed from complete automation. To achieve the stage of full automation, the processing machines themselves would have to be automatic as well. Mechanizing the transfer of work being moved between machine operations, however, is frequently more economical and practical than operating automatic process machinery as well.

The automatic handling of work in process from machine to machine by inclined conveyors and chutes, usually follows the sequence of handling operations illustrated in Fig. 5.

Continuous Flow at Work Level Between Machines and Conveyors

Besides the automatic transfer of work in process from machine to machine, provisions are also common for the movement of work between various types of machines. These machines can be located across traffic aisles, past one or several dividing walls, and up or down one or more floors.

Throughout these otherwise obstructed paths, various conveyors and trolley systems transport work in process uninterruptedly up, down, through walls and floors and around corners. Conveyor paths also lead through hot ovens, acid baths and cavernous tunnels, as well as up and down chimney-like ways, across plant ceilings, and through skyways towering above plant yards, waterways, streets and railroads.

Work traveling at bench-height level on roller conveyor beds is another means of moving material. The conveyors run alongside each line of machines. Work is passed along the conveyor from machine to machine as each operation is completed. Throughout this bench-height continuous flow, manual handling for transportation purposes is virtually eliminated.

Work-level transportation can also be provided by overhead trolley conveyor hooks as shown in Fig. 6. In this case, the heavy engine-block flywheels travel in an endless stream over the stationary line of still heavier engine blocks awaiting these wheels for assembly. Each engine-block is mounted on a revolving work-positioning pedestal to facilitate the assembly operation by eliminating the weight-handling function.

An example of the versatility of conveyors in overcoming structural obstacles, reaching out to selected points and providing continuous circuitous routes for the transportation of work material through all corners of a plant is given in Fig. 7. In this diagram, two continuous flow lines for transporting work in process in the manufacture of electric motors are traced from the receiving point at Station 1 clear through to shipping at Station 12. The solid line is for stators, and the dashed line for rotors.

These two lines encounter the following types of material handling devices in their order of appearance in the flow cycle: Traveling crane; sunken roller conveyor; inclined belt conveyor; overhead chain conveyor; gravity roller conveyor; power roller conveyor; turntable; fork truck and outbound carriers.

The two flow lines follow a parallel course using common handling facilities through initial operations. They separate at the fifth operation and merge again at the packing sta-

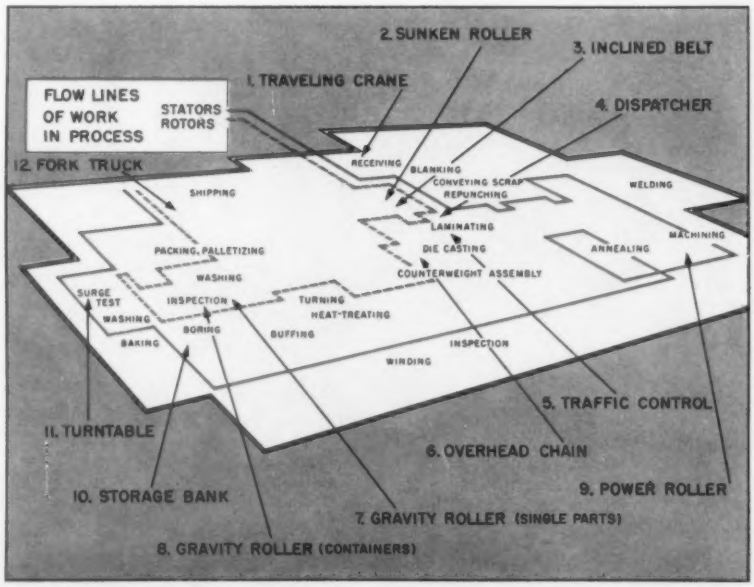


Fig. 7. Here is a good example of the versatility of materials handling equipment and how it can transport work material through various finishing operations

tion. The total unduplicated travel of all material handling equipment, exclusive of lift trucks, is slightly more than two miles.

Overhead Handling By Trolley Hooks and Carriers

The internal transportation of work in process in the overhead space above the machines and assembly lines makes possible the installation of continuous and endless flows of work from station to station without interruption by floor traffic or other plant activities. These flows are usually made on carriers suspended from trolley hooks, in turn, suspended from an overhead conveyor chain which can be made to travel in either direction as desired.

The steady flow of suspended trays may travel at any desired level, go up inclines, dip down to work stations, follow a straight path, loop around corners, crossover above aisles, continue to different floors and link several buildings.

The drop-tray arrangement in Fig. 8 symbolizes the degree of automation already achieved in overhead transportation by trolley conveyors. In this application, a steady stream of suspended tray carriers is kept moving without interruption to pre-designated work stations in assembly operations. This system is delivering an unfailing supply of small parts to scores of assembly workers in an automobile supply plant.

In this photograph, a tray of component parts is being withdrawn as needed by the assembly worker who is continually supplied by suspended carriers. When the carrier arrives by overhead conveyor, it is lowered to the work station. After it has been emptied, it is elevated to feed back into the conveyor system. This drop is actuated by an air valve controlled by the assembly operator.

In addition to lowering or raising the carrier in this manner, the air valve also enables the operator to adjust the carrier to any desired height. It can, therefore, be raised mechanically by the operator as trays are emptied, thus positioning each tray at the work level needed.

As shown in the schematic diagram in Fig. 9, the travel route of a trolley carrier system consists of the following two independent chain-type powered conveyor circuits supported overhead by I-beams: "A" powered conveyor serves the final assembly area; "B" powered conveyor covers the subassembly areas. The two circuits are linked together by two transfer rails utilizing gravity feed.

The carrier journey, as keyed to the diagram, may be described in the following sequence of 7 steps: 1. Start. Carrier trays are loaded with instrument subassemblies. 2. Worker shoves loaded carrier onto overhead trolley conveyor. 3. Loaded carrier is picked up by dogs on powered conveyor. 4. Carrier moves around "B" conveyor until it reaches transfer point. 5. Carrier is switched over to its proper storage rail. 6 Carrier is lowered at drop station by assembly operator. 7. Empty carrier is returned to subassembly area.

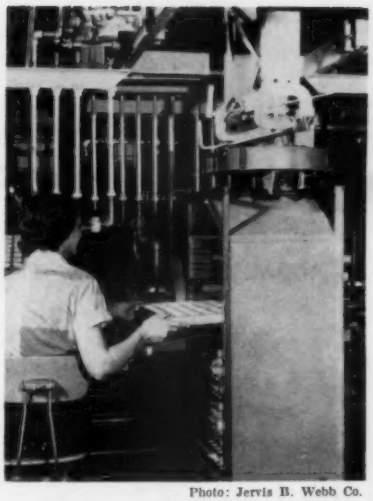


Photo: Jervis B. Webb Co.

Fig. 8. An overhead carrier is another means of moving material at work level. Operator removes tray of small parts

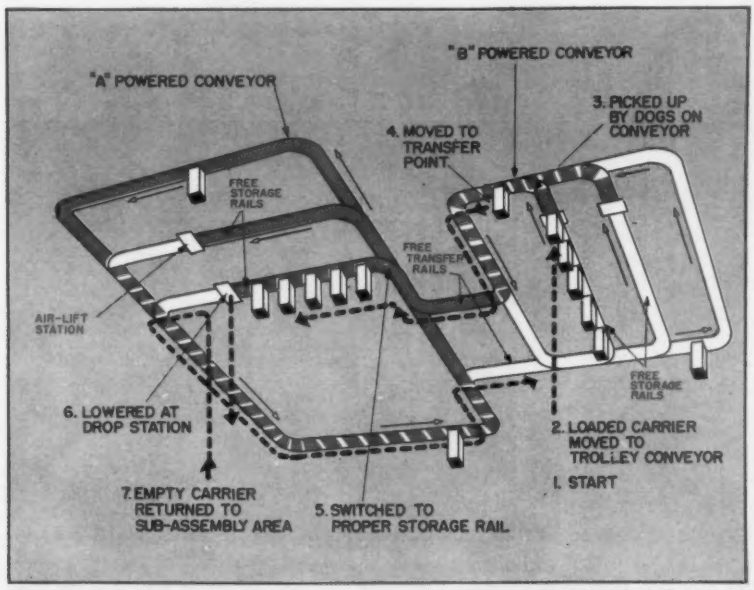

"B" POWERED CONVEYOR
"A" POWERED CONVEYOR
3. PICKED UP BY DOGS ON CONVEYOR
4. MOVED TO TRANSFER POINT
FREE STORAGE RAILS
FREE TRANSFER RAILS
AIR-LIFT STATION
FREE STORAGE RAILS
6. LOWERED AT DROP STATION
2. LOADED CARRIER MOVED TO TROLLEY CONVEYOR
1. START
7. EMPTY CARRIER RETURNED TO SUB-ASSEMBLY AREA
5. SWITCHED TO PROPER STORAGE RAIL

Illustration: Jervis B. Webb Co.

Fig. 9. Schematic shows the journey of an overhead carrier through air-lift stations at the A-C Spark Plug Division of General Motors Corp., Flint, Michigan

Inter-Machine Transportation By Trucks and Cranes

For continuous and automatic movement of work, as already pointed out, endless powered conveyors operating at any level are in a class by themselves, and usually without a close substitute. Yet, for flexibility of inter-machine movement and precision placement, reliance is largely placed on the handling features possessed by various types of industrial trucks. These units have found wide application to the tasks of receiving and storing incoming raw material, handling work through process, handling jigs and tools, disposing of machine scrap, and finally storing and shipping the finished work.

In both indoor and yard work, gantry cranes are especially useful as companion equipment for heavy overhead traveling cranes under which they can operate. With a coordinated arrangement of this kind, the light, local loads can be expedited by the gantries, and the heavy ones by overhead bridge cranes. **End**

Formula for Plant Betterment

Solutions Can Come From Anywhere. Check All Sources

By **ROBERT H. EMERICK**, Consulting Mechanical Engineer

HERE is a simple formula for plant betterment. It goes like this: plant betterment = observation + imagination + experience × everybody.

The application of the formula is illustrated by the engineer who walked into a company's power plant for the first time. He saw a couple of men rolling steam tubes into the steam drum of a cross-drum, sectional header boiler, and he asked the shift superintendent:

"What happened?"

The superintendent shrugged his shoulders.

"The steam tubes in that boiler have been leaking off and on ever since the boiler was installed more than five years ago. Three or four service men have been sent out by the boiler company to correct the job. They've tried grooving the seats, lengthening the tubes, shortening the tubes, rolling heavily, rolling lightly, all the tricks they knew, and nothing stopped the leaks permanently. We've just got a lemon."

The engineer walked around the boiler slowly, several times. He studied the arrangement with respect to the plant, and all aspects of the setting. His experience told him the boiler design was good, it was not a lemon. His imagination got to work and suggested that a recurrent leak, developing only after the boiler began to steam, indicated the cause must lie in an expansion strain, somewhere. The problem was to locate the part, or area, that was creating the strain.

Boiler Problem Solved

One by one his mind eliminated possibilities, and pretty soon he felt sure he knew. He said to the superintendent:

"Take a crowbar and break away the brick from around the steam drum. It's too tight. When this boiler gets hot, something has to give. The tubes buckle a bit and move in their seats. Allow this boiler more room inside the setting, and you'll have no more trouble." See Fig. 1.

That did it. A five year problem in troubleshooting was solved by an outsider who exercised the same qualities of observation, imagination and experience that are essential parts of the plant betterment formula.

Actually, plant betterment is really troubleshooting. It helps discover potential troubles and unfavorable conditions before they seriously affect the operations of the plant. It is everybody's business in one aspect or another, which is the reason "everybody" is a part of the formula.

Plant betterment goes into every one of the five areas of plant management—design, operation, maintenance, safety and personnel—so that everybody is affected in some measure.

Small to medium size organizations who feel themselves economically unjustified in staffing a per-

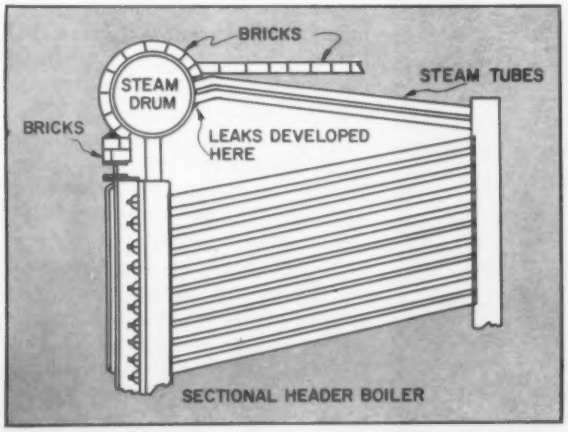


Fig. 1. Solution to the problem of steam tubes leaking in a boiler came from an outsider. Cause: Brick was too tight around steam drum. Solution: Allow more room inside setting

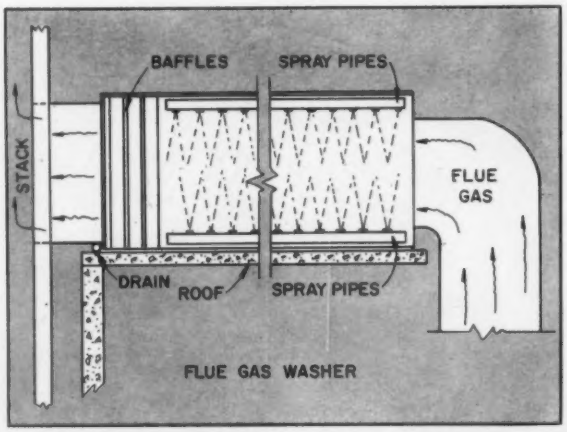


Fig. 2. This washer arrangement worked well when it worked, which wasn't for long. Trouble: Sulphuric acid attacked pipe nozzles. Solution: Company switched to stainless steel piping

manent Plant Economy Section, have two other roads to plant betterment benefits. First of these is the group inspection technique. The Panama Canal Company illustrates this technique in the area of plant safety. Here is how their plan works:

Once every month, the safety engineer of every activity, which in the Canal includes mutiple shops, two shipyards, power generation and transmission, public transportation, general construction and so on, meets with all the other safety engineers for a discussion of practices, and for a group inspection of the host activity. These inspections make the circuit of all activities as the months pass, so that eventually every shop and every working area is gone over by the group.

Fresh Viewpoint Important

The significant feature of this group inspection is the freshness of view that it brings. Somebody always sees a hazard or a condition that the home safety man has missed, simply because the strangers are unhampered by habit and routine.

Everytime a group meeting occurs with the plant engineer, design engineer, production engineer, and other parties in interest, for the purposes of correcting some unsatisfactory aspect of plant operation, we have a plant betterment discussion. However, this is not group betterment technique in complete measure. The full scale job is accomplished only if this group takes to their feet and makes a concerted inspection throughout the plant to see what they can see.

The alternate road to plant betterment for the small company is to utilize the services of an experienced private consultant. For example, here is the case of a box plant that felt they needed a new and larger boiler.

"We've done our best to make it stretch," management told the consulting engineer, "even changed the stoker to get more steam, but after two years of struggle this looks like the end. We'll just have to spend the money for a new one."

The engineer set out on his inspection tour of the plant, his purpose to see for himself where the steam went and why. He soon discovered these adverse factors to steam economy and satisfaction: 1. Much of the steam piping that served unit heaters scattered throughout the plant had no insulation. 2. Obviously half a dozen heaters had been added, or relocated, without correcting the size of the steam piping and returns. 3. Several heaters were hung too low for adequate condensate drainage and they were waterlogged all the time. 4. Doors to the truck loading platform, 12 ft high, were opened and closed many times a day, but no means had been provided to arrest the inflow of cold air. 5. Most of the unit heaters and all the traps throughout the system were in need of cleaning.

The consultant made some sketches, wrote some specifications, and the plant personnel did the work. They covered the bare pipes, ran new ones where the existing lines were too small, reset the unit heaters properly, mounted two new heaters to blanket the loading platform doors, cleaned out and adjusted the traps. And the result? The old boiler was ample and the new boiler was not purchased.

The significant thing is that somebody in a group inspection program often possesses a specialized knowledge that contributes substantially to plant betterment. For instance, some years ago, the Shanghai Power Company's plant on the banks of the Wangpoo was having trouble with fly ash. Flue gas washers similar to the sketch, Fig. 2, worked well when they worked, which wasn't for long. The coal was a high sulphur product of Chinese mines, and as the fly ash and flue gases passed through the scrubber,

(Continued on page 206)

CHECK-OFF LIST FOR PLANT BETTERMENT

1. Non-Supervisory Employee

   a. How many chances for improvement did you see during the past 30 days?

   b. Indicate location and field of improvement.

   c. What did you do about your ideas for improvement?

      _____Turned in a beneficial suggestion
      _____Explained to supervisor
      _____Other action

2. Supervisors

   a. During the past 30 days, did you observe any area in which improvement could be made?

   b. What action did you take to accomplish the improvement?

      _____Turned in written report to superior
      _____Made a verbal report to superior
      _____Informed an executive of the company
      _____Initiated the improvement myself

   c. Do you visit other departments either as an individual or part of a group, to seek areas for plant betterment? How often? (Once a month is satisfactory)

3. Executive Management

   a. How often do you walk through the plant to get an idea of the efficiency of the plant layout and operations? (Once a month is satisfactory)

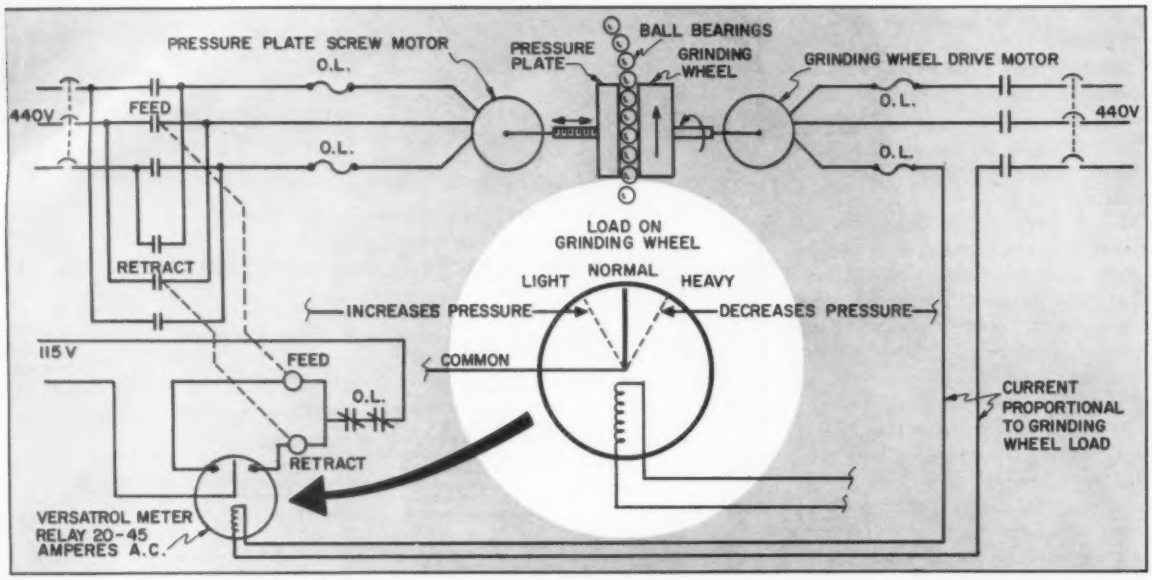
   b. For regular action on plant betterment do you:

      _____Maintain a plant economy group?
      _____Retain an outside consultant for periodic surveys?
      _____Direct department heads to make group inspections?
      _____Run a beneficial suggestions program?
      _____Promote employee improvement:
            _____By in-plant training on company time
            _____On the employees' time
            _____Correspondence

   c. Do you require department heads and key personnel to keep in touch with industrial developments by:

      _____Regular reading of appropriate magazines
      _____Attendance at meetings and conventions

Fig. 3. Does your company have a plant betterment program? Have employees review the check-off list above to see if they are practicing plant betterment



Grinding motor load fluctuations are sensed by meter-relay which adjusts pressure plate to correct load conditions

Motor Control Ups Machine Output

Closed Loop System Corrects Motor Load Automatically

AUTOMATIC GRINDING of steel balls to a tolerance of plus or minus 0.0005 in. is based on the principle that the load on the motor driving a grinding wheel will vary with the grinding pressure. This load is continually indicated on the dial of a meter-relay. Two pointers on the meter-relay are set at the permissible high and low load limits. When the load reaches either extreme, contacts lock on the indicating pointer and the appropriate fixed pointer, and the system adjusts the grinding pressure back to normal.

The control circuit was worked out in cooperation with engineers of Assembly Products, who also supplied two slave relays and a d-c power supply. Before the controls were installed on a number of machines, operators periodically noted the load and manually adjusted the pressure. A complete cycle on each machine, from rough to finished work, now requires only six hours, compared to the former eight.

At 115 volts, the contacts for the meter-relay are connected to the starter coil of a feed motor that operates a screw for advancing and retracting a vertical plate. The steel balls move constantly in a circular channel in the plate and are ground by a vertical grinding wheel.

When the motor load falls to the low limit on the meter-relay, indicating grinding pressure is too light, the plate carrying the steel balls is moved closer to the grinding wheel. Conversely, too much load causes the plate to back off. In addition, the high limit acts as a safety feature, since high grinding pressure could break the grinding wheel.

The meter-relay has a suppressed zero scale reading from 20 to 45 amperes. Since normal load on the drive motor is about 24 amperes, the limit pointers are set at approximately 23 and 28 amperes.

To provide close control accuracy and to prevent the screw from moving too far in either direction while grinding pressure is being adjusted, a self-releasing circuit is used with the meter-relay. When either the high or low load limit is reached this has the effect of both sampling the signal to determine whether the load has returned to normal and of taking corrective action while the load is being sampled.

In the self-releasing circuit used in this application, the meter contact circuit is carried through a pair of normally closed contacts on the load relay. When a limit is reached and the load relay pulls in, both its contacts and those in the meter are released. The meter then pulses with the load relay until the signal drops below the point of contact. The load relay is slowed down by a condenser, providing interruption twice a second. Generally, a single pulse will correct the load.

The schematic diagram is shown in its simplest form and does not include the self-releasing circuits or manual push button controls.

The application of this feedback control system is limited only by the imagination of the plant engineer. It can be applied wherever a change in the process causes a change in motor load. This change is then used to control devices that will return the load to normal. **End**

How To Get REAL Control of CONTRACT MAINTENANCE

With contract maintenance costs getting out of hand McCulloch Motors plant engineering department started an intensive study of the dollar-leakage that is inherent in uncontrolled maintenance contracting. What they have done can be done by any firm: the basis of their work is a careful study of the problem, what causes it and what should be done to remedy it

By **FOSTER G. COOK**, Plant Engineering Material Coordinator, **McCulloch Motors Corporation**

McCULLOCH MOTORS' system of contract maintenance control was, and still is, having growing pains. First problem encountered was control of contractor's personnel on McCulloch Motors' property. This problem was solved by devising a control sheet, Fig. 2, that lists contract, contractor, reason maintenance man is in our plant, scheduled date the man is due, the date and time he actually arrived, the time he left, his name, and a column for remarks.

First dividend paid us by the control sheet was realized when it proved that we were having unnecessary emergency call-ins that could be eliminated by having our personnel first check to see what actually was wrong before calling the contractor. Example of this was given when someone in the plant called the maintenance contractor because of difficulty with an ice making machine. When the service man arrived he found that the switch was turned off.

This checking procedure affects bidding on flat rate contracts to be discussed later on. We have pinpointed unnecessary contractual services and through the plant engineering staff we have begun to weed these services out.

We justify each and every contract service by comparing:

1. Cost of having McCulloch Motors' personnel perform the same service.

2. Cost of eliminating service or revising entire program.

This Has Been Done in Just Six Months

Starting with no system of control over contract maintenance except a few requisitions and blanket purchase orders, McCulloch Motors Plant Engineering, within six months, has accomplished the following:

- **Reduced emergency call-ins of outside service men by approximately 93 per cent per month.**
- **Reduced unnecessary services, and engineered new equipment to reduce cost.**
- **Attained close control of contractor's personnel.**
- **Initiated strict requirements for bidding.**
- **Acquired new sources of contract maintenance service.**

3. Cost of contractor's service. This cost figure is obtained by bidding and we try to get at least three bids on each contract. Bidding is done by companies that have been invited to do so. There are many companies unable to perform services. Other companies have caused us trouble in the past. These firms are not asked to bid. Between the time we ask for bids and the actual time we receive bids an inspection of the bidding company is made. These are the things we look for.

a. Facilities. Has he the proper equipment to do the job? Is his equipment, work space, spare parts section, etc., well organized so there is no time lost on work taken into his shop? Does he keep his shop clean, organized and uncluttered?

b. How is his stock of parts and how is he set up to acquire parts for equipment that he would service at our plant? Does the company keep trucks well equipped with parts for service calls?

c. Where is his location in relationship to our plant? This can affect bidding due to mileage charges to and from McCulloch Motors on emergency call-ins. McCulloch Motors is located in an industrial area consisting of the major aircraft companies and the many job shops associated with aircraft.

The California Freeway system does not extend to our plant at the present time. Therefore, if a contractor is located on the other side of the city it may mean additional downtime on equipment while the service man is traveling to our plant.

d. Personnel is an important fac-

CONTRACT: Instrument Service

CONTRACTOR: Barber-Colman Co., 190 Glen Arm St.
Pasadena 2, Calif.

PERIOD: Jan. 1, 1958 to Dec. 31, 1958

SCOPE OF WORK: I. Regular periodic service shall consist of:

1. Check and calibrate instruments, thermocouples, etc.
2. Adjust and repair as required.
3. Report special conditions.
4. Make service reports.

II. Plus call-ins on all the above.

III. Work to be accomplished in:

	No. of Instruments	
1. Heat treating	20	
2. Die casting	30	Frequency:
3. Research	2	Every 60 days
4. Plating	3	

IV. Cost shall be:

a. Regular hourly rate	$.....
b. Overtime rate (after 5 pm.)	$.... ...
c. Sundays & holidays	$.....
d. Mileage--Rate per mile	$.....
e. No discount on parts	

Fig. 1. This is a brief form of the contract. It gives, in capsule form, the name of the contractor, period of time for which the contract runs plus all phases of the scope of the work including the frequency of regular service, plus charges

CONTRACT: Instrument Service

CONTRACTOR: Barber-Colman Co., 190 Glen Arm St., Pasadena 2, Calif.

MONTH: January, 1958

DESCRIPTION OF WORK	COST	SCHDLD DATE	ACTUAL DATE			SERVICE EMPLOYEE SIGNATURE	REMARKS
			DATE	TIME IN	TIME OUT		
Call-in on No. 8571, Model 221 Heat Treat	27.00		1-15	11 30am	1300	Austin	water leaked on unit and blew up. Instr. Repair on Req. 70248
Periodic service of ALL instruments	186.00	1-20	1-20 1-21	800 800	1625 1625	Austin	See Service Rept. Model 221 Ser No. 67693 - Die cast instrument to be replaced. See Req. 70249 for NEW inst. New serial - 99999
Contract Total Work completed written on 2-15	213.00 $213						Overhauls and NEW instr. Req's 70248 Repair Req's 70249 NEW

Fig. 2. This is the control sheet that gives all pertinent data on one contractor's services for predetermined period. It has eliminated some unnecessary call-ins

tor in determining what caliber of maintenance service McCulloch Motors receives.

We now watch the number of call-backs between periodic preventive maintenance on each and every contract because the call-backs can cost more than the periodic service calls. Our experience has shown that contract maintenance personnel often hurry through their periodic service calls leaving many areas unchecked, resulting in call-backs.

In one instance we were averaging a call-back every 3 days between periodic service and the average cost per call was $27. Upon investigation, we learned that the service man was new. He had been a maintenance man in a plant where the repairs were made rapidly in order to keep machinery operating. He was rushing through the periodic service and the results were that it cost our company money.

This does not mean that all call-backs can be eliminated; but they can be held to a minimum. In fact, our contracts and requests for bids are now stating just that. We try to keep all call-backs under 7 per cent of our cost for yearly periodic service. To do this it has paid us to police contracts and to be alert to any deviation from the normal.

The hourly rate charged for service can, obviously, increase the cost of service. Our contractors' charges range from $4.50 per hour to $8.50 per hour. When a serviceman's time starts from the moment he leaves the service shop it is imperative that he not be held up in checking in or out of McCulloch Motors, and that his work be simplified both by the contractor and by our company.

In addition, when we inspect a bidding contractor we look for a well-rounded stock of parts for servicing equipment, i.e.: If the service man is not fully stocked to service our equipment he will have to travel back to the shop and return. Meanwhile we are paying for time that is not fully utilized in servicing our equipment. Burden rates are investigated when bids are submitted to determine if we can do the job at our burden rate, for the number of hours expended by the contractor in a year.

Contractor personnel must be covered by public liability for personal injury or property damage while working on McCulloch Mo-

tors' property. We also ask for certificates of above-named insurances with a ten day notification to us before cancellation of the insurance. Lapse of insurance may cause us to cancel a contract.

Contract Evaluation

One criterion for contract evaluation is, "What would this cost to McCulloch Motors in hours per year to do this job, including burden?" In many cases we are under the prevailing going rate for service organizations because we do not include profit in our rate. How many hours a day would it require our men to do same job?

Another criterion: "What would this cost in spare parts and other material it would be necessary to keep in stock?" This includes storage cost, handling cost, accounting cost, purchase order cost. At McCulloch Motors we try not to stock spare parts unless they turn over every three months. An exception is special machine parts or material (and most of the equipment under contract is special).

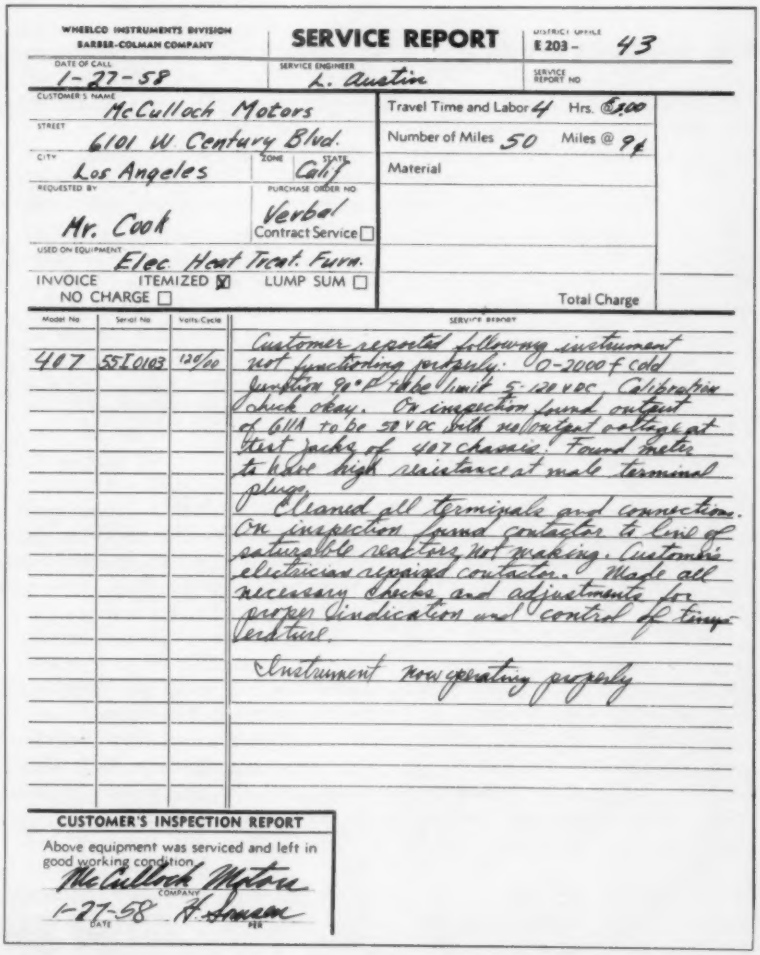
Maintenace materials and parts are stocked on a minimum-maximum basis. Parts are kept closer to the minimum in order to have as low an inventory as possible at all times. The parts necessary to handle a specialized service, as a rule, will cost more than the labor and materials will cost for a contractor to do the same job. The reason for this is that McCulloch Motors has many specialized machines, each different from the last put in service.

We try to keep up to date with the best equipment available for the job. With so many models and makes it would be almost impossible, cost wise, to stock all parts required. On certain machines we do stock some parts but these are parts that are common to all pieces of equipment. In addition, they are the fastest moving parts, not because the equipment is malfunctioning but because parts breakdown cannot be controlled for various reasons.

If a piece of equipment requires an overhaul outside our shop we ask for quotes on cost of repair plus price of new equipment, plus life expectancy of both. From this information we determine which way to go at our plant—repair or buy a new machine. If at all possible, the equipment is repaired at our plant. The cost of transportation to and from vendor, the price of a purchase order, plus the cost of equipment downtime makes it necessary to repair whatever equipment we can at our plant. The number of machines on periodic service that were previously sent out for overhaul has now decreased to about 5 per cent of the total for the last six months of 1957. All this was accomplished when McCulloch Motors rate of production was at the highest and rejects lowest. Thus, we have attained product cost reduction—an indirect result of the firm policing of McCulloch contracts.

Time and material contracts are loose due to the fact that you don't know how much it has cost you until the end of the year. Flat rate contracts on a yearly basis are limited in number at present. We will not go too extensively into flat rates until we have lowered our call-backs to below the 7 per cent of the past year and kept them there.

Contractors who are bidding for the first time on flat rate contracts take, as a rule, the previous year's cost, add anywhere from 10 to 30 per cent for additional call-backs and extra parts, and then submit a bid. That is for the first year. For the second year the contractor will be able to lower his bid thanks to his efforts to control costs. Flat rate contracts give firm costs. And firm costs are of definite advantage when preparing, and hold to, budgets. An alternative that was dismissed was the acquisition of leased equipment. The pros and cons of leased equipment can take pages but



WHEELCO INSTRUMENTS DIVISION
BARBER-COLMAN COMPANY

SERVICE REPORT

DISTRICT OFFICE E 203 – 43

DATE OF CALL: 1-27-58
SERVICE ENGINEER: L. Austin
SERVICE REPORT NO:

CUSTOMER'S NAME: McCulloch Motors
STREET: 6101 W Century Blvd.
CITY: Los Angeles ZONE: STATE: Calif
REQUESTED BY: Mr. Cook
PURCHASE ORDER NO: Verbal Contract Service ☐
USED ON EQUIPMENT: Elec. Heat Treat. Furn.
INVOICE ITEMIZED ☒ LUMP SUM ☐
NO CHARGE ☐

Travel Time and Labor 4 Hrs. @ 5.00
Number of Miles 50 Miles @ 9¢
Material
Total Charge

Model No.	Serial No.	Volts/Cycle	SERVICE REPORT
407	55E0103	120/60	Customer reported following instrument not functioning properly. 0-2000 f cold junction 90° & 1 Abe limit 5-120 v DC. Calibration check okay. On inspection found output of 6th to be 50 v DC with no output voltage at test jacks of 407 chassis. Found meter to have high resistance at male terminal plugs. Cleaned all terminals and connections. On inspection found contactor to have of saturable reactors not making. Customer's electrician repaired contactor. Made all necessary checks and adjustments for proper indication and control of temperature. Instrument now operating properly

CUSTOMER'S INSPECTION REPORT
Above equipment was serviced and left in good working condition.
McCulloch Motors (COMPANY)
1-27-58 (DATE) A. Jensen (REP)

Fig. 3. These service reports are required from every contractor on each piece of equipment serviced by maintenance contractor. All suggestions from service man regarding handling or servicing of plant equipment must be placed on this report

we at McCulloch Motors feel that it is not practicable for the following reasons:

1. Corporation policy —not feasible. Not very good for tax purposes.
2. Treasury department frowns upon rentals and leases.
3. Life expectancy usually is less than the life of the lease.

New sources for services are constantly appearing and with these come problems of how to evaluate them. As already explained, inspection of contractors' facilities is a simple, practical method of selecting companies capable of doing our work. The bidding company's references are checked for what type work he does and where he does it. Written references are ignored. We have never seen a bad reference and a reference will not say anything about the company's faults.

WORK COMPLETED NOTIFICATION
AND/OR PROGRESS PAYMENT AUTHORIZATION

Originating Dept. 749-Plant Engineering Date Work Completed 2-15-58

Work Authorized on P.O.# 000001 Item No. All P.O. Complete? Yes ☐ No ☒

Vendor Jones Instrument Co. Actual or Est. Price $27.00

Brief Description of Work Completed:* 6-15 Call-in on Model 221, Serial 67271 Jones Instrument in Heat Treat (605-21), invoice #32210. Periodic service of Jones Instruments conducted on 6-20-58 & 6-21-58. Invoice 32211

*When prepared by Materiel Dept. personnel for dies or tooling, indicate the Part No. to be made by this die or tooling and also the Receiving Report number which received the first production parts.

Distribution: Original - Accounts Payable
Duplicate - Purchasing - Attention of Buyer indicated on Purchase Req.
Triplicate - Retained by Originator - Attach to copy of Purchase Req.

Prepared By Cook Date 2-15 Approved By HME. Date 2-16-58

McM G-128

Fig. 4. This is the Work Completed Form. Departments signing the Form are responsible for payment. Signature on Form is admission that price is right

Write It— Don't Say It!

McCulloch Motors at present is demanding that the following information be supplied on service reports of each piece of equipment serviced: the location, what was done to the equipment, and how much it cost to do the job. Within the first few months of control we have found that not enough time has been spent in servicing the equipment, that there are cases of overcharging for periodic service calls, and that the lack of information as to special conditions existing are seriously affecting proper usage of equipment.

If a serviceman tells someone, orally, that a piece of equipment could be better utilized if we made a modification in the equipment or its surroundings, it leads to criticism, poor coordination and poor operation. Now, we request that the facts be put on the service report. Then, while the service man is still in our plant we have him talk to our maintenance foreman or to the plant engineering staff engineers.

The plant engineering material coordinator then follows up to make sure that the corrections are made. Service reports can also tell you when and how a piece of equipment was overhauled. All service reports are filed in the contract file.

Another phase of checking on the contractor consists of work sampling his jobs and checking invoices against contract. Spot checking of work is done while the contractor is here or immediately upon completion of his work. Invoices are checked with the contract for all prices and dates of service.

We have devised a Work Completed Form. Thus, the department signing the Work Completed Form is responsible for payment of the invoices, whether they were satisfied with the work or not. This signature is also tacit admission that the price was correct for the job accomplished. Our maintenance contract and purchase orders state that the invoices will be checked by Plant Engineering, so the accounts payable section does not pay the invoice even though it may match the price on the McCulloch Motors purchase order. We also check to see if a Work Completed invoice has already been paid. This prevents duplicate payment of invoices.

McCulloch pays invoices on the 5th, 15th and 25th of each month which permits us to get discounts for fast payment of invoices. Therefore, vendors get their money quickly. This is important to small companies and the discounts pay for the accounting operation.

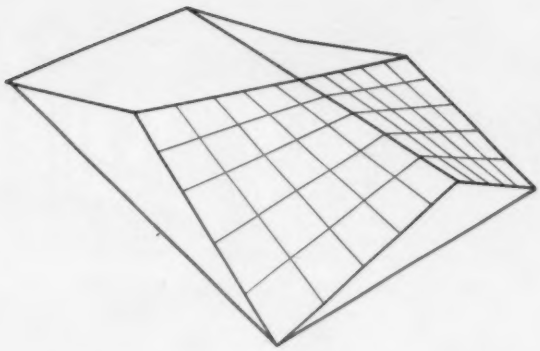
Specifications for contract bidding at McCulloch Motors are reviewed by our corporation attorney. After bids are submitted, the corporation attorney draws up a contract that is almost a duplicate of the specifications for bidding. The contractor, to whom the bid is awarded, then comes to our plant for signing of the contract. All questions are answered by the attorney and by the plant engineering material coordinator.

Upon signing the contract, copies are distributed to accounting, purchasing, plant engineering, and the attorney's office. Purchasing issues a purchase order when plant engineering issues purchase requisition and a copy of the contract to them.

McCulloch Motors contracts state that there will be no charge for cancellation. This was inserted so that contractors would not buy extra equipment and charge McCulloch for the equipment in the event of cancellation.

In addition, our bids and contracts specify the number of days, following periodic service, that contractor can be called back at no charge provided breakdown was not the fault of McCulloch Motors. This has helped contractors to realize that periodic service must be thorough and will cost him money if equipment is not correctly serviced.

Summing up: We find that these contract maintenance controls have saved the corporation money and more than paid the salary of one person to control contracts. Without controls, our plant engineering budget would have been far above figures anticipated. Highly competitive bidding, close checking of work and invoices, and extreme cost consciousness has paid off in better service, better functioning of equipment, and far less downtime. **End**



Schematic presentation of typical roof segment. The actual units are supported at the four corners. Each span of two quadrants has a steel tendon. (In color)

Texas Instruments' New Plant

"Space Frame" Gives Building Operational Flexibility

By JIM McDADE, Chief Industrial Engineer, Semiconductor-Components Div., and
FRED J. SNYDER, Supervisor, Plant Layout and Facilities; both of Texas Instruments, Inc.

This building is part of a long range plan for the development of the site. The unitized roof construction used is advantageous for future expansion. The overall internal roof surface has natural sound diffusing characteristics. In addition the internal surfaces of each roof unit are considered as reflectors for the mercury vapor lighting system. Columns supporting the corners of four units form master columns which house piping and air ducts.

Texas Instruments' new Semiconductor-Components Building is an outstanding departure from the usual in the field of industrial architecture. Its "umbrella" roof made of thin shells follows the pattern of a hyperbolic paraboloid. A space frame with its reinforced concrete V-struts and yokes provides room for plant services, equipment.

The principles involved in the planning of this plant are important—Perhaps you can adopt some of them—

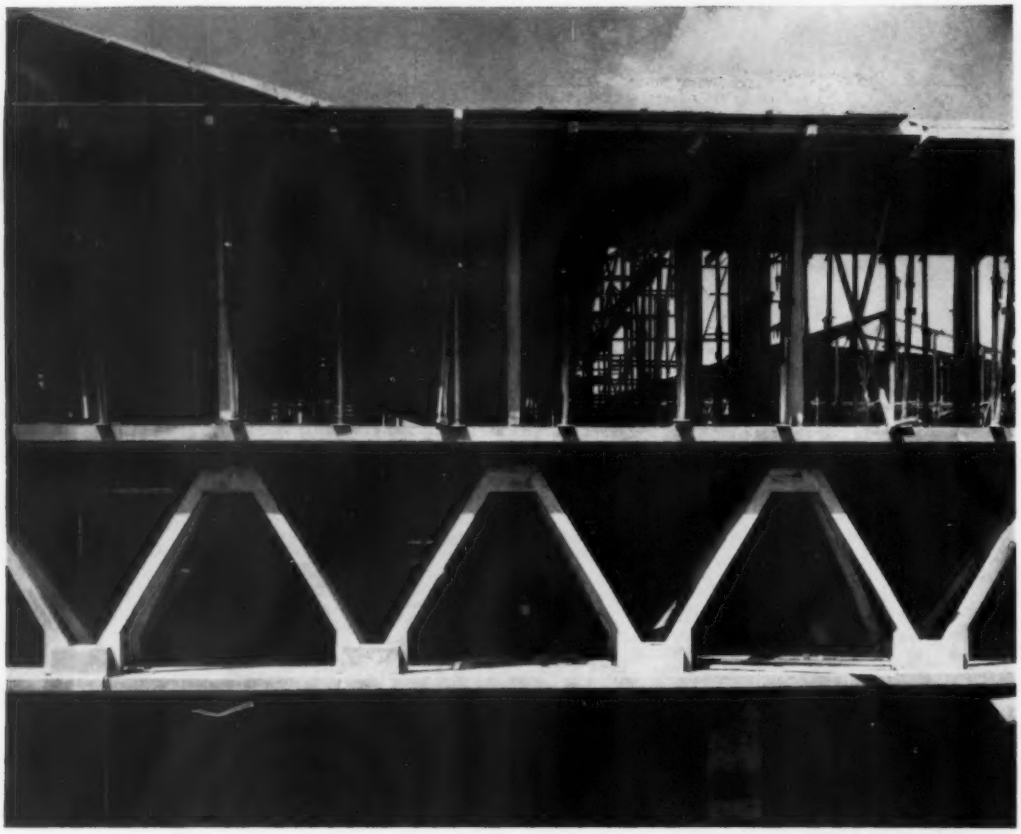


Fig. 1. A cross section of the building under construction shows the strut arrangement. Welded joints top and bottom of strut assemblies have been covered with concrete. V-members were made at site

T. I.'s New Plant—Flexible Building, Flexible Site

ON THE OUTSKIRTS OF DALLAS, on a hill site overlooking the city, there is something new and different in the manufacturing industry. Texas Instruments Incorporated, one of the world's leading manufacturers of electronics and semiconductor devices, has constructed the first of a series of buildings on its new 300-acre site.

In the initial preplanning, the management of Texas Instruments insisted that planned flexibility not only be designed into the buildings, but also into the entire site project. Accordingly, several nationally known architects were invited to present their proposals for the development of the site, and also to present architectural sketches.

In the spring of 1956, Architects O'Neil Ford and Richard Cooley, together with their associate in master planning, Sam Zisman, were engaged to design and plan this overall site. The results prove that the first building meets the request of Texas Instruments' management that the building be: 1. functional, 2. readily expandable, 3. suitable for economic plant rearrangement, 4. flexible, 5. economical in initial investment, 6. economical in maintenance, 7. architecturally beautiful.

In the overall site planning, buildings were to be spaced so that they merged with the natural terrain—with its ravines, trees, creeks, and hills. The site was developed so that all buildings would take advantage of this topographical relief and blend into the beauty of the surrounding community.

The first building is for the Semiconductor-Components Division. Later, buildings are planned for research, administration, geophysics, and other manufacturing efforts. This first building, the Semiconductor-Components Building, will house the administrative, engineering, and manufacturing functions for the production of semiconductor devices and miniature electronic components. The building is of multi-story construction, and includes approximately 310,000 sq ft of usable floor area. It is rectangular with dimensions of 378 by 442 ft. Entrances to floors are at ground level.

The building is of unitized construction consisting

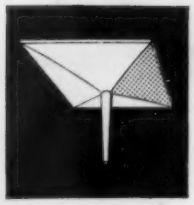


Fig. 2. Roof quadrant corners are supported by individual columns (arrow). The latter are located above members called yokes found in the second tier space. Vertical loads are transmitted to round columns found at ground level

of 42 units or bays. Each bay is a square supported by hollow concrete columns on 63-ft centers. Two recent architectural innovations are combined in the construction of the building: 1. extensive use of prestressed and precast concrete members, and 2. thin shell concrete roof construction.

Unitized construction of the building allows for extensive additions to the plant without detracting from the overall architectural design. The retaining walls of the building were precast for economical and speedy construction. The concrete roof shells, which are the ceiling of the manufacturing area, are hyperbolic paraboloids. See Figs. 3 and 4. Besides being economical, this construction is planned to diffuse both light and sound in the manufacturing area.

In addition to this unique construction, another of the features of the building are the glass enclosed gardens in the center. These gardens are wells in the building and are open to the sky, affording visual relief to personnel working in the building. Surrounding these central gardens are passageways through which plant visitors can view engineering and manufacturing operations without interrupting plant manufacturing flow.

The first floor of the building houses the administrative and engineering functions for the plant. These areas are laid out so that administrative functions are closely knit together and can be handled rapidly and efficiently. In addition, centralized lounges, library, conference rooms, rest rooms, and auditorium facilities are available.

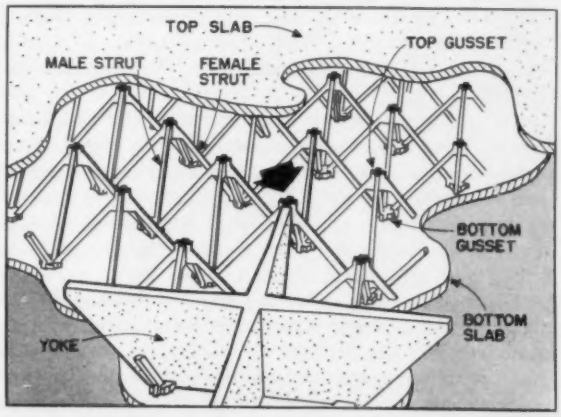
The flooring of the first floor is asphalt tile applied to concrete ground slab. To assure flexibility in plant arrangement and rearrangement, a minimum of permanent dividing walls is used. Division of areas is effected through the usage of ceiling-high, movable-partitions.

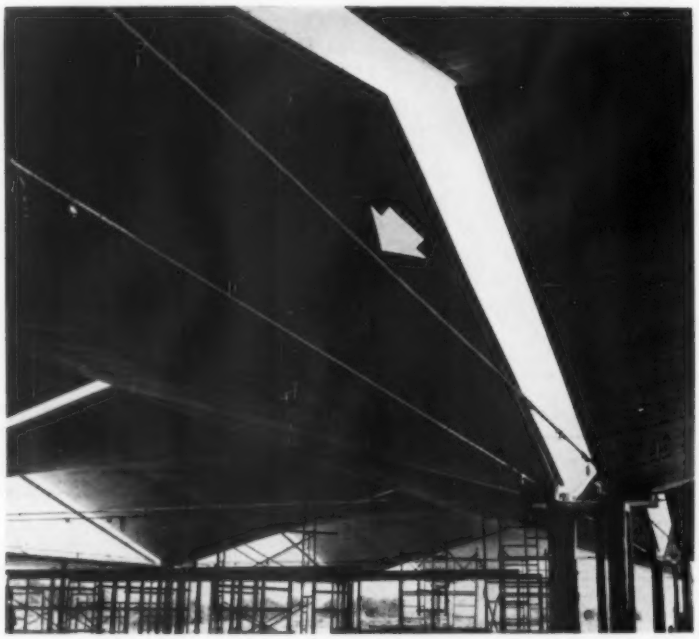
Power distribution for convenience outlets, cable for telephones, and piping required for miscellaneous areas, are all enclosed in this metal partitioning. The additional initial costs accruing through the use of these metal partitions is offset by the flexibility afforded through their use and subsequent savings in plant rearrangement of areas due to plant expansion. All utilities for the first floor are concealed above a luminous ceiling.

For visitor reception there is a spacious lobby at the front of the building. Lining one side of the lobby is a series of rooms which are used for personnel and vendor interviews.

The north and west side perimeter walls of the first

Fig. 3. Cutaway sketch of space frame construction. Note typical relationship between a strut assembly and yoke (arrow)





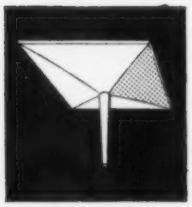


Fig. 4. Group of roof units presents a rolling, sweeping ceiling effect. The thin roof shells were formed in place. The neighboring wire tendons (arrow) run between corners of each of the units

floor have alternate window and brick sections. The ceiling slab extends out and over the first floor a distance of 31.5 ft.

On both sides of the 10.5 ft wide garden passageways are additional alternate window and masonry wall sections. These walls are alternated in such a manner that no sunglare will go through the windows.

The portion of the building over the first floor is a "space-frame" type of structure made of poured-in-place top and bottom reinforced concrete slabs and precast reinforced concrete struts. See Fig. 1.

At the bottom level of this space-frame, forming its floor, is a reinforced and prestressed concrete slab with stressing cables terminating at the thicker slab portions around the yokes. The ceiling is a 6-in. reinforced concrete flat slab poured in place over the struts.

These struts are precast reinforced concrete members terminating at the top and bottom slabs and top and bottom gussets. Each strut assembly is formed by joining male and female inverted V-members. See Fig. 3.

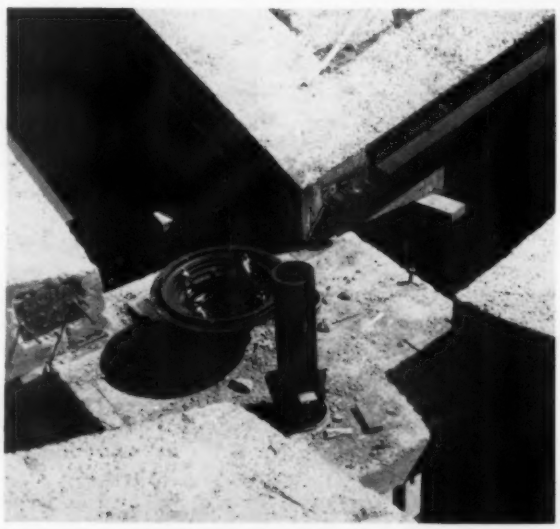
The gussets to which the strut legs are welded, are a reinforcing rod and angle assembly. See Fig. 7. After welding, the strut and gusset connection is covered with concrete.

Yokes, located over the columns, are poured in place, and are mild steel and stressing wire reinforced. The yokes pick up several struts.

Top and bottom slabs and the yokes between the slabs use light-weight structural concrete with a minimum compressive strength of 4,000 psi at 28 days. The precast concrete struts in the space frame and the concrete connections used in the gussets use regular sand and gravel concrete with a minimum ultimate compressive strength of 5,000 psi at 28 days.

In the space frame, which might be likened unto an attic between two floors, are installed the electrical, mechanical, and telephone services required in the operation of a modern manufacturing plant. Access holes on a grid of 10.5 ft center-lines are installed in the upper and lower slabs of this space frame, and through these holes the various facilities and utilities are fed

Fig. 5. A small slab ties together the tops of roof columns. Water will drain through slab which also has other openings



directly to the required usage points. Unused access holes are filled with grout. As future requirements dictate use of additional facility entrances, the grout can be punched through, thereby allowing entrances for the facilities required.

The mechanical equipment room extends over two levels, the lower or ground level, having an area of approximately 9,000 sq ft, and the upper level approximately 5,000 sq ft. This lower area contains the refrigeration equipment for the air conditioning system, the main steam boiler, air compressors, the deionized water equipment, and electrostatic air filtering equipment.

At the second level of the mechanical equipment space, which is twelve feet above ground level, is a mezzanine area which includes plant engineering offices, work shops, rest rooms for maintenance personnel, and the unit substations required for supplying power to units located in the mechanical equipment room.

The exterior walls of the space frame are anodized aluminum sandwich type panels mounted on angles which are attached to the building. Spaced access doors blending with the anodized panels are spaced along an exterior wall of the space frame. These allow for the passage of heavy equipment required for air conditioning, power distribution, and mechanical systems.

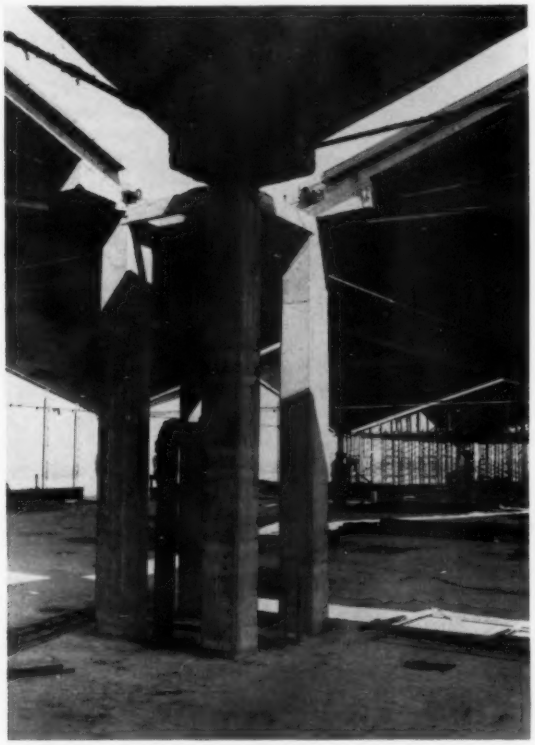


Fig. 6. When covered these columns will form one large column. Room air will pass through this column besides piping

Top floor is allocated to the manufacturing department and extends over almost 150,000 sq ft. With the exception of the walls surrounding the central gardens, it is almost entirely free of dividing walls. Four-foot hollow square columns 63 ft O. C. are utilized on this floor. Besides being supports for the concrete roof, the hollow columns also enclose sprinkler system risers, drainage and vent pipes, and the air conditioning diffusing system. See Fig. 6.

Interior of the upper perimeter wall is composed of 8-in. concrete blocks backed up by bar joist wall supports. The outer side of this 8-in. concrete block wall has an application of steep asphalt weatherproofing material. The exterior of the curtain wall is a white Georgia marble facing (Fig. 9A) mounted against the bar joist wall supports. The marble slabs are held in place with a stud and rosette clamp assembly.

Snow White Area

Sixty thousand square feet of the manufacturing area on the second floor falls into a classification termed Snow White. It is sealed from the rest of the second floor area and from the rest of the building principally by glass and masonry walls. A group of combination air locks and locker rooms are located at various entry points to the Snow White area.

All personnel entering this ultra-pure area must enter through a negative pressure air lock and don special lint-free clothing. Automatic vacuum shoe cleaning devices are also installed in these air locks and located at doorways so that each person must walk over a shoe cleaning device prior to entering the Snow White area.

The roof structure over each bay in the building is a lightweight concrete shell formed of four hyperbolic paraboloid sections varying in thickness from 3 to 5 in. and spanning 60.5 ft. See Fig. 4. The lightweight structural concrete used in these shells has minimum compression strength of 3,000 psi at 28 days.

The building has a 20-year bonded four-ply asphalt and gravel roof with cement plastic wearing surface. Prior to the installation of the four-ply asphalt felt, 1½ in. of rigid insulation was applied in three layers at ½ in. per layer. Each layer of insulation has a uniform coating of steep asphalt and the felt has been applied on top of the rigid insulation. Over the final layer of felt applied to the roof an additional coating of steep asphalt has been applied and imbedded in this coat is 75 lb of ⅜ in. inert particles per square. The final and exterior surface of the roof is a coating of "Thermo" compound with marble chips imbedded in this compound. This roof has a U factor of 0.10.

Power Service

Power service from the utility company's termination poles goes underground to the primary switchgear located in the utility compound area where it is easily accessible to plant maintenance personnel. This service includes two 13.2 feeders which have two enclosed air immersed disconnect switches. A normally open tie switch is connected across the load side of the feeder switches. In the event of an outage of one of the feeder lines, its switch can be opened. The tie switch can be closed and the entire load of the building can then be thrown on the other feeder line with little interruption of service.

Service from the primary switchgear to the building is underground through Transite conduits. Each pri-

mary feeder line consists of three-conductor leaded cable insulated for 15 kv grounded neutral service, shielded.

Power is distributed throughout the building at 13.2 kv, using 350 MCM three-conductor interlocked armored cable. This distribution system feeds eight 1000 kva unit substations. There are four unit substations on each primary feeder. Each substation is spotted at a power load center, with a nearly equal share of load.

Each indoor load center unit substation consists of an incoming line section, transformer section, auxiliary compartment and a distribution feeder section. The complete unit substation is of coordinated design. All sections are of equal depth and height, so that when they are bolted together, there appears to be one unit.

The incoming line section of each substation houses an air immersed load disconnect switch and fuse combination, together with line type lightning arresters.

Load center transformers are of the dry type, air-cooled design for indoor service. They are designed for three-phase 60 cy service with the high side winding connected for 13,200 v delta and the low side windings for 277/480 v wye connections, 4-wire service with full capacity neutral.

Between the transformer section and the distribution feeder section of each power center substation, there is an auxiliary compartment which houses not only the bus transition but also indicating meters, their related instrument transformers and transfer switches. A hinged front panel on this compartment carries an indicating voltmeter for measuring line to neutral voltage on the transformer secondary. Also mounted on this panel is an ammeter and transfer switch for the indication of current on each phase of the transformer secondary. A test block and plug has also been furnished on this panel for the connection of portable recording meters when required.

Fig. 7. Steel reinforcing rods extending from the struts are welded to angles which also have been fastened to slab rods

Circuit Breakers

Air circuit breakers in the distribution feeder section are of the 600-v class, manually operated, three pole, trip-free, equipped with dual magnetic trips and with faulted phase targets. These circuit breakers are mounted on drawout pantographs for the easy removal of the breakers for maintenance and inspection.

Interlocked armored cable and bus duct are used for the 480-v, secondary power distribution throughout the building. Bus duct in this system is of the plug-in type with rated capacity of 400 or 600 amp. Plug-in switches used are the fusible, quick-make and break type, with means of padlocking in the off position.

The grounding system for machine tools and testing equipment consists of several ½ x 2-in. copper bus bars with 98 per cent conductivity. These bus bars extend to a depth of 25 ft below finish grade level, the upper terminating ends are located alongside the columns in the space frame area. From these termination points, the grounds are gridded through the pipe space. Take-offs from this grid are carried through access holes in the top slab of the space frame and tied into equipment at the required points of usage.

A new type diffused lighting system has been installed for the entire 140,000 sq ft of manufacturing area of the building. Taking advantage of the hyperbolic paraboloid sections of the ceiling shell for a natural reflective surface and using information provided by Westinghouse concerning color corrected mercury vapor lamp performance, Texas Instruments engineers worked out their own indirect lighting system.

Lighting Determination

Angle of light and number of fixtures required were determined by TI and Westinghouse engineers through the use of a full-scale 4,000 square foot mock-up of one unit bay. Groups of mercury vapor lamp fixtures and ballasts were mounted on a platform spanning columns with the fixtures angled to give equally distributed light over the entire ceiling area of the unit bay.

The General Exhibits Building at the State Fair Park in Dallas was rented by TI to conduct this experiment. From data obtained of lighting intensity taken at various angles of fixture focusing, definite locations and angle settings were determined for use in the new Semiconductor Components Building.

To eliminate direct glare from the lamps, shielding was provided by a simulated cove mounted in front of the light fixture. The architect then incorporated a comparable method of shielding in the lighting design

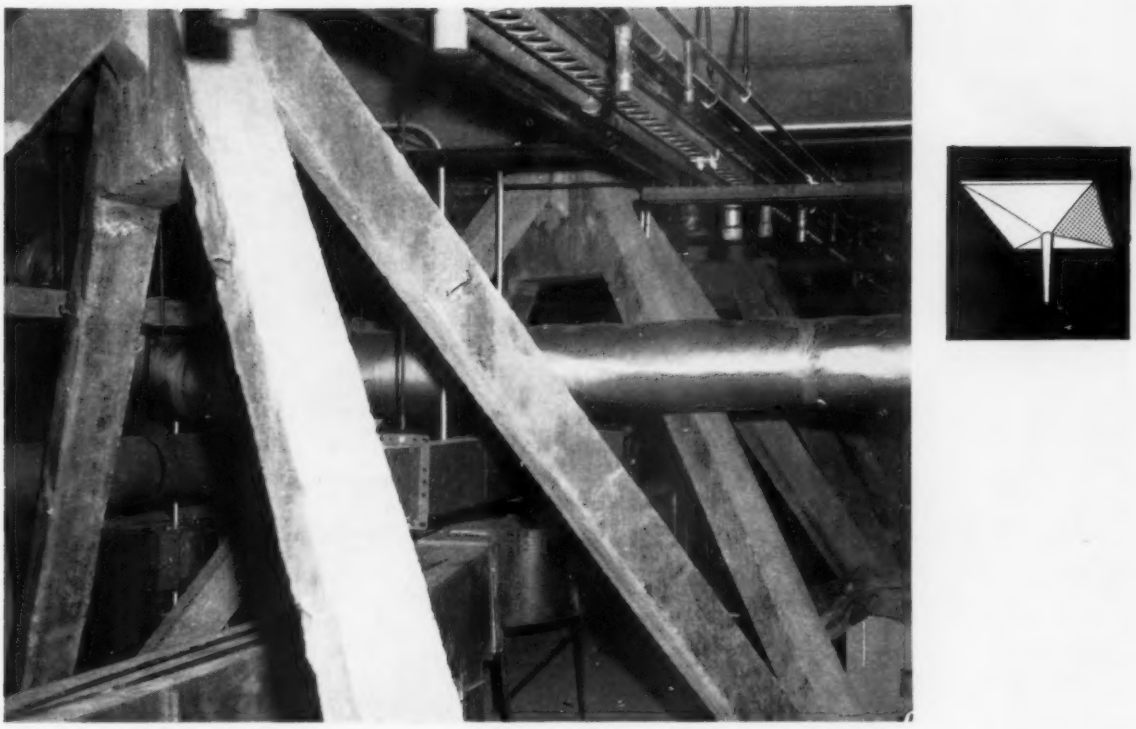


Fig. 8. View of a portion of the space frame between the two manufacturing floors shows routing of bus and air ducts; horizontal piping runs are also conveniently located within the space frame

of the building. This lighting system maintains an equally distributed 60 ft-c of light at workbench level.

Auxiliary lighting for the mercury vapor system is provided by incandescent lamps which are also mounted on the tension rod platform. These auxiliary lamps are used for the safety night lighting of the unit bay areas and for preliminary lighting during the three-minute warm-up period for the mercury vapor lamps.

Cost Comparison

A comparison of costs between the mercury vapor indirect lighting system and a conventional fluorescent lighting system providing comparable lighting intensity, shows that the initial cost of the mercury vapor lighting system is approximately 10 per cent less than the cost of the fluorescent lighting system. In addition, the maintenance cost for a programmed lamp changing system is less than 25 per cent of the maintenance cost incurred in a similar program of changing fluorescent tubes. The distribution feeder voltage to lamp loads is at 480 v for greater efficiency and economy.

Lighting for the office and engineering areas in the first floor areas is of the luminous ceiling type. Strip light fixtures used in this luminous ceiling take 96-in. lamps, and are placed against the ceiling at 36-in. centers. Ballasts used are 277 v, 60 cy, to operate the lamps at 430 ma. Placed between the strip light fixtures are acoustic panels for sound absorption and light reflection.

An aluminum member suspension system holds corrugated vinyl plastic diffusing material under the light fixtures positioned at 2 ft - 2½ in. O. C. and holds the corrugated vinyl plastic material at a height of 8.25 ft from the floor. Light intensity throughout the first floor area is maintained at 60 ft-c.

All major lighting in the building is controlled through the use of an IBM remote control system. All lights, except the safety night light, are automatically switched off and on at predetermined times through the use of this control system. Overriding manual switches are located in various convenient locations for overtime or night shift work. From a cost analysis of this remote control lighting system, it is estimated that the savings incurred will pay for the complete control system in less than two years.

Three centrifugal machines are used to air condition the building. They have a total capacity of 1200 tons refrigeration when circulating 3600 gpm of condenser water entering at 85 F and leaving at 95 F, chilling conditioning water to 42 F. Each unit is equipped with a capacity control system which permits continuous variable loading from 10 to 100 per cent. This control system automatically stops the unit when its load falls below 10 per cent.

Each evaporator is a multipass, horizontal shell and finned tube type of unit. Tubes are integral finned seamless copper, rolled into the tube sheets. Eliminators are multiple layers of V-trough metal screen mounted in removable frames. Condensers are similar to evaporators in construction except that tubes and tube sheets are 90-10 cupro nickel metal.

Distribution of both cold and hot air throughout the building is through 106 air handling units strategically located throughout the space frame. See Fig. 10. These

Fig. 9A. Georgia marble slabs are held together in the plant's exterior wall facing

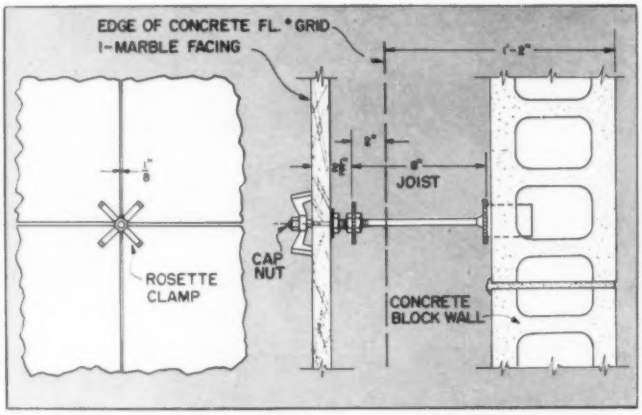


Fig. 9B. Sketch presents an idea of the method used to fasten marble

units have a filter section, cooling coil section, reheat coil section and fan section.

Hot water supply to all hot water coils in the air handling units is supplied by a hot water boiler having a rating of 150 hp and capable of generating 5,021,000 Btu per hour continuously. The boiler has a modulating gas firing system.

To obtain the required 20 per cent relative humidity in the Snow White area, dehumidifying equipment was required in conjunction with the air conditioning equipment. This dehumidifying equipment is supplied by a Hygrol System.

The air conditioning system itself, as previously mentioned, is a dual pipe system. Ductwork supplying air to the Snow White area and returning it to the air conditioning equipment requires extraordinary fabrication for sealing purposes.

All ducts, both round and rectangular, must be air tight. Joints have rubber base gaskets and seams are sealed with a compound.

Because of the variety of chemicals used in the manufacture of semi-conductor devices, a special type fume hood exhaust system was installed. These fume exhaust hoods are located in the Snow White area.

The ductwork extending from the fume hoods to the exhaust fans was fabricated with as much care as the ductwork for the air conditioning system.

The general contractor for the Semiconductor-Components Building is Robert E. McKee, General Contractor, Inc., of Dallas, Texas. The other contractors are: Mechanical—Beard Plumbing Company, Dallas, Texas; Electrical—Harman Electric Company, Dallas, Texas; and Sprinkler System — Grinnell Company, Dallas, Texas. **End**

Fig. 10. An air handling unit installation in the space frame

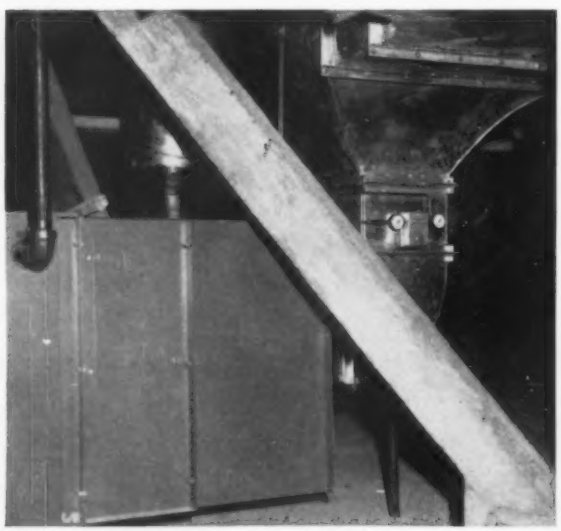
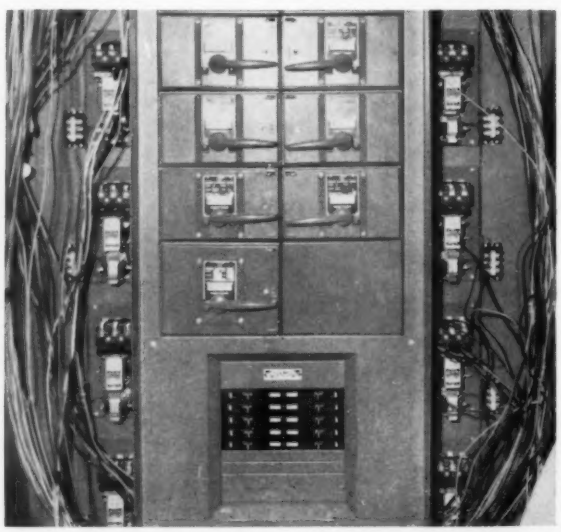


Fig. 11. Section of one of the second "story" lighting panels



Stop Sling Failures

Here Are Helpful Hints and Accident Findings

"IT SEEMS THAT something like this has to happen every so often to keep us on our toes—lucky nobody was hurt." So said a safety man when investigating a recent accident.

In Fig. 1. is the broken sling that let go while lifting and turning a 40 ton piece of machinery. And, it wasn't the sling's fault—it was the old story of using a sling too small for the lift. The safety department marks it against a department as human error.

The safety man's remark was almost gospel truth; in spite of all the safety rules ever drawn up, someone, somewhere is forever neglecting to pay the slightest attention to them. Unfortunately, many men, following a mishap, come up with a statement to the effect that they did it that way a dozen times.

Fig. 1. Shredded lengths of a wire rope sling which failed through overload

Failure Case Findings

This is exactly what happened in the sling-failure case. Investigation revealed the following:

1. Load to be handled weighed over 40 tons.
2. Slings used were 1½ in.—6/37 construction. Breaking load, 76 tons.
3. Two slings were used, one on the main hoist of crane, and one on the auxiliary hoist.
4. To make the hitch the slings were passed through shackles, the one on the main hoist, followed an angle of 90 deg, thus greatly reducing the strength of the sling.
5. At one stage of the operation in turning the piece over, the entire weight was taken by the sling on the main hoist.
6. With a load of 45 tons and a breaking load of 76 tons for the sling, this gives a safety factor of about 1.7. Furthermore, due to the method of slinging, the factor was further reduced by perhaps 50 per cent.

Most cable manufacturers recommend a safety factor of 5 to 6 for slings, and there is a trend today towards increasing it still higher. Some suggest a factor of 8. This might be going "overboard," for in taking the case in hand, it would have required three 2-in. slings to handle the load when keeping to such a factor.

Many large overhead cranes, rated at 100 to 200 tons have, as far as the cables are concerned, safety factors of 3 to 4. Why go to 8 on slings? The answer is that slings are subjected to much more abuse than crane cables. Also, slinging methods contribute toward lessening the rating greatly.

An investigation of lifting accidents in a large industrial plant showed that approximately 97 per cent of the mishaps were chargeable to the human factor.

The wrong man for the job—the man who has not been properly trained—also rates high as an accident-causer. Some years ago a contracting firm had the job of placing an 80-ton locomotive in the hold of a ship. The rigger foreman was sick, so the job was taken over by an inexperienced man. He slung the locomotive with a hawser cable which he thought was 'big enough.' The cable broke and the load dropped to the bottom of the ship.

(Turn page)

In line with company policy the name of the author has been deleted.

The locomotive was wrecked and the ship was tied up all winter for repairs.

Lifting accidents arise for the following reasons:

1. Suitable sizes of slings and other accessories are not used.
2. Improper use of good equipment.
3. Too much haste. Not taking time to study the job.
4. Plain ordinary carelessness and thoughtlessness.

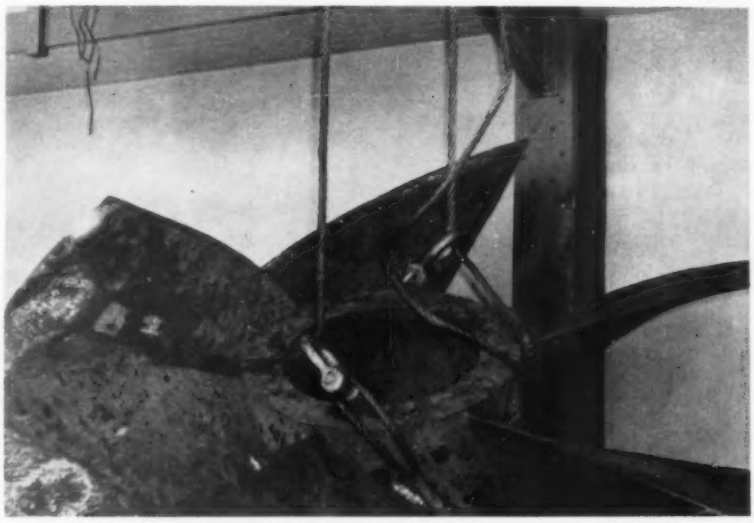
Many lifting accidents come about when handling machinery which is awkward to sling, especially pieces that are infrequently handled.

As a guide when lifting heavy machinery, the following points will assist the rigger in keeping out of trouble:

1. Ascertain, if at all possible, the weight of the piece to be lifted. If in doubt, contact the manufacturer. If necessary get expert help.
2. Choose slings for the lift having a safety factor of at least 6. Refer to information sheets supplied by the cable manufacturers, giving safe load, breaking load, the percentage that must be deducted for splices, angles, etc.
3. When slinging avoid sharp corners on the piece being lifted, sharp bends in the cable around shackles, eye-bolts, etc. Be sure the slings have thimbles in the eyes. Old car tires make excellent guards.
4. Examine slings carefully for broken strands and flat wires on the outside diameter. Do not use a sling that has been kinked. Scrap it.
5. Should a particular lift be especially awkward to sling, it is sometimes wise to consider making up yokes or other fittings that will dispense with slings entirely. In other cases temporary lugs or U-bolts can be welded to the piece to act as hitching points. These are later burned off.
6. The rigger should not allow anyone to hurry him. He should take the time to make a lift safe.

The foregoing rules will help keep the rigger clear of trouble and avoid embarrassing investigations. He should keep in mind that he is handling machinery worth many thousands of dollars and lives that are priceless—one slip can ruin his reputation. **End**

Fig. 2. This view gives an idea of way slings were applied prior to accident



Load Lifters Roll on Rails To Store and Remove Engines

FORTY VARIATIONS of automobile engines are received, stored and fed to the assembly line in a General Motors' assembly plant in South Gate, California, by means of two pairs of electric-hydraulic lifters.

Engines on dollies are picked up at the railroad siding and taken to the storage rack by one of the two Colson lifters serving the incoming area.

At the proper storage rack opening, the operator positions the loaded platform to approximately the same height. Then cams automatically index it for accurate alignment. A four-degree tilt starts the engine rolling into the rack; spring-load cushions break the impact of one dolly ramming another.

When an engine is needed for assembly, it is removed from the opposite side of the rack. **End**

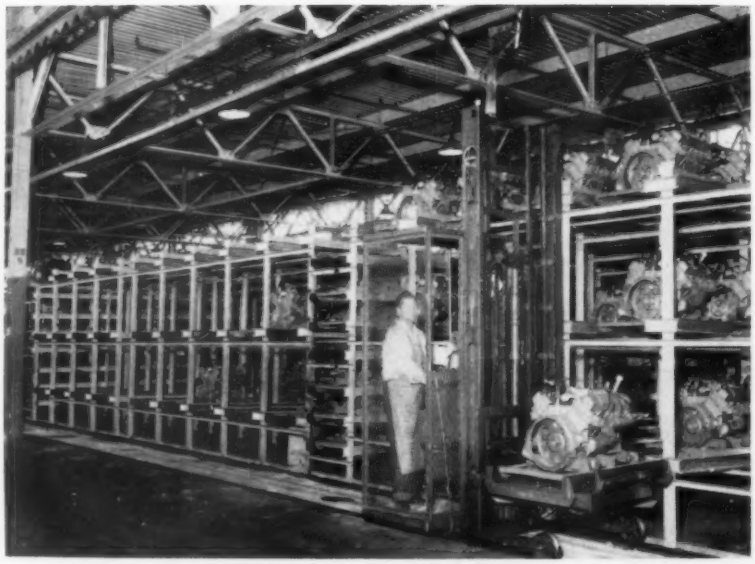


Fig. 1. The engine dollies roll into rack by gravity after automatic cam indexing

Refrigerated Aftercoolers—
One Way To Kill Compressed Air Moisture

Moisture in plant air is one of the deadly enemies of instruments, finished products, pneumatic tools. Increased maintenance, downtime and ruined work can result from improper moisture removal. In this article the authors describe one type of equipment used in moisture removal... the refrigerated aftercooler

By D. H. McCUAIG and R. B. SCHUMACHER, Worthington Corp.

ALMOST AS SURE as death and taxes we have with us the problem of plant air moisture. The question of how serious it is lies with each individual case, yet moisture removal is so simple that it's often overlooked.

All free air contains considerable moisture in the form of water vapor. The amount varies according to location and climatic conditions. Since vapor-carrying capacity is greatly reduced under pressure, water condenses in the piping system as soon as the air cools. The pressure of water in a compressed air system has many harmful effects.

In pneumatic tools, wear is abnormal, tool life is greatly shortened, and air consumption considerably increased. Thus tool maintenance cost is extremely heavy and increased cost of operation results.

For paint spraying, cleaning motors, and many similar uses, compressed air must be entirely free from moisture.

In the machine shop, expensive machine tools and their operators must stand by while the air pipe lines are blown out to rid them of condensed water before blowing chips from the work.

In pipe lines, condensed moisture produces water hammer and reduces the carrying capacity of pipes. Water accumulating at low points will freeze in cold weather, usually damaging the pipes and causing leaks.

Let's start with the fact that one of the best ways to get rid of water vapor is to condense it. As a liquid we have a relatively easy time of handling it or at least it's a problem far less complicated than when moisture is present as a vapor. The next logical step to consider is the easiest place to condense the water vapor and the answer obviously is "on the high pressure side of the system." The higher the pressure, the higher the refrigeration temperature possible with resulting reduction in refrigeration horsepower to achieve a given dew point—essentially our only concern.

If the plant air supply dew point is maintained below any possible pipe surface temperature, then there can be no condensation occurring in the pipe. In addition to avoiding condensation in the pipe it is necessary to keep the moisture content low enough so that, on expanding the air from 100 psi down to atmospheric pressure, moisture does not form in the tool or other device. The exact level of cooling to give low enough moisture content is determined by a number of factors. These include the nature of the plant requirements, pressure of the air delivered to the aftercoolers, and the tool characteristics.

The nature of the plant requirements vary from "moisture free" air for instruments, to machinery maintenance problems encountered in high speed pneumatic tools. These problems are most noticeable in spring and fall when the low night temperatures combine with the usual accompanying high

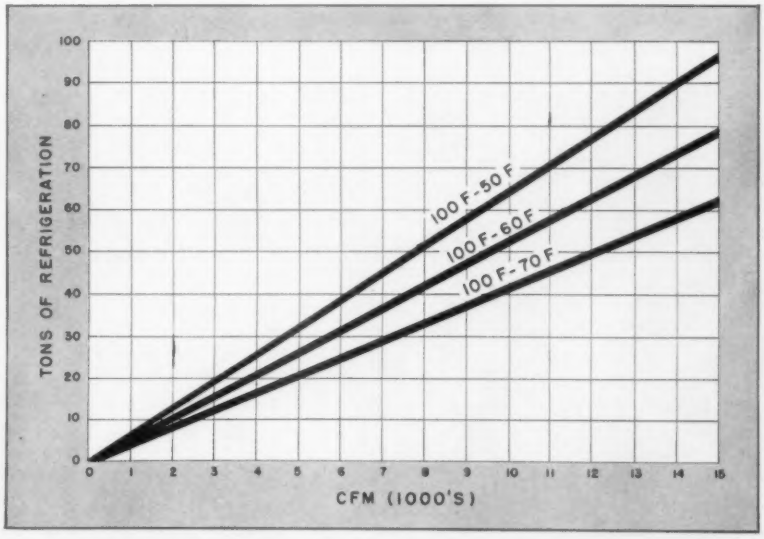


Fig. 1. This set of curves shows the approximate load characteristics for cooling quantities of air. Curves based on standard air at 70 F and atmospheric pressure

early morning humidity conditions to load the air lines with free moisture.

When air is used in instruments, moisture may damage the sensing part of the instrument. Thus, prior to complete failure, there may occur inaccuracy of readings and loss of control. This is costly from a replacement standpoint. But the maintenance cost and the loss of the instrument's function is usually higher. The greatest cost is incurred when moisture causes a malfunction of a controlling instrument and expensive processes are affected. The greater the degree of automation, the less this can be tolerated and the more serious the results.

In precision drilling, high speed pneumatic drills are commonly used and plant air moisture is especially costly. Not only does the emulsion formed by air and water clog the tools, but it also causes excessive wear, annoyance to the operators and damage to the ferrous products in the form of resulting rust.

Obviously any figures quoted here for a given situation of plant air moisture would not apply to any other situation due to the many variables. The best answer to what it means, in dollars and cents, is found by examining each operation, studying plant maintenance logs during winter and summer months as compared with spring and fall months.

This will be sufficient to answer the question and substantiate the expenditure for refrigeration aftercoolers. The curves in Fig. 1 show the temperatures normally required to eliminate condensation in plant air lines (assuming the use of conventional water-cooled aftercoolers utilizing the cheapest available water source to do the high temperature cooling job). It also shows what this means in terms of refrigeration capacity for a given air flow.

Plant air supply pressure determines the level of cooling required to achieve a given result. The curves in Fig. 1 are based on 100 psi supply which is a common plant air system pressure. However, for approximation, the values also would apply to reasonable variations, acknowledging the fact that dew point temperatures would vary accordingly. It is only the air heat exchanger design that varies for high pressures but it must be remembered that at higher pressures the available cooling water is more effective, and therefore the resulting refrigeration requirements smaller.

What Unit To Choose?

Practical limits to the application of refrigeration machinery sets the choice of machinery rather than limits its use. One type of unit is better suited than the other to handling varying load conditions. Yet, economics favor the latter. To be specific, the standard water chiller, Fig. 2, providing chilled water to a pipe line aftercooler, gives the most flexible and foolproof arrangement.

For those applications where more or less steady flows and temperatures are involved, a significant savings in cost and space can be achieved through the application of the direct cooling packaged refrigerated aftercooler shown in Fig. 3. Here the air is passed directly through the refrigeration machine, thus eliminating the need for the additional pipe line aftercooler on the conventional setup. It also does away with its pump and associated piping. The cooling is done more efficiently since only a single heat exchange is involved in the operation.

Generally, little or no additional piping is required for the direct cooling application, since as a package unit it can be installed at any convenient location in the piping. A large industrial plant in New York has installed two large capacity packaged air chillers in space that would otherwise have been wasted. One is installed directly in the piping on a platform erected for it in a top corner of one of the employee locker rooms. The second is on top of a concrete block washroom in the boiler house; both places are out of the way, but accessible.

The direct cooling aftercooler is limited by not having an inherent flywheel effect to carry through those periods when less than minimum load is experienced; this can result in short cycling. Less than minimum load is that load condition when refrigeration is still required but when air flows and temperatures are such that the total refrigeration load is less than that provided for.

Examples of this condition are when minimum air flows, for extended periods, are less than approximately 25 per cent of design. Example: during curtailed night shift operations and weekends. The situation best suited to the application of the direct cooling packaged air chiller is that load condition which demands operation near or at full load most of the time.

Variable load conditions can be provided for but these must be worked out on an individual basis by means of studies of the exact plant air requirements. Complete studies of this sort will indicate whether a direct cooling aftercooler or a water chiller-pipe line aftercooler combination should be used. **End**

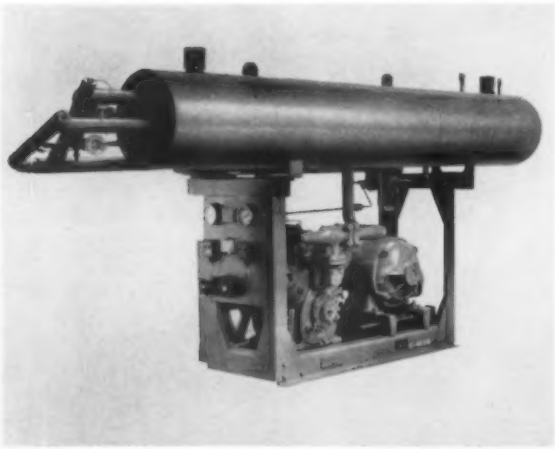


Fig. 2. This is a standard water chiller providing chilled water to a pipe line aftercooler. It is a flexible arrangement

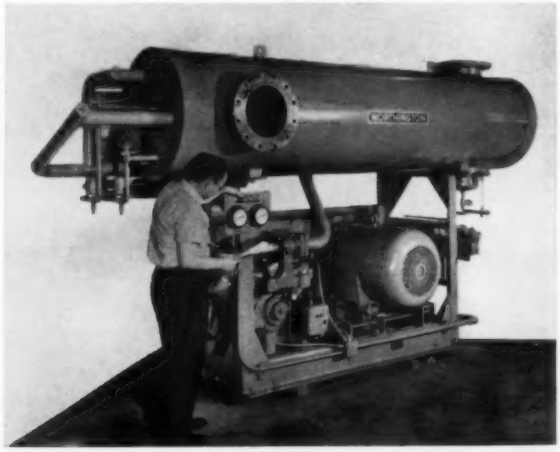


Fig. 3. For use where more or less steady flows and temperatures are involved, is this direct-cooling packaged aftercooler

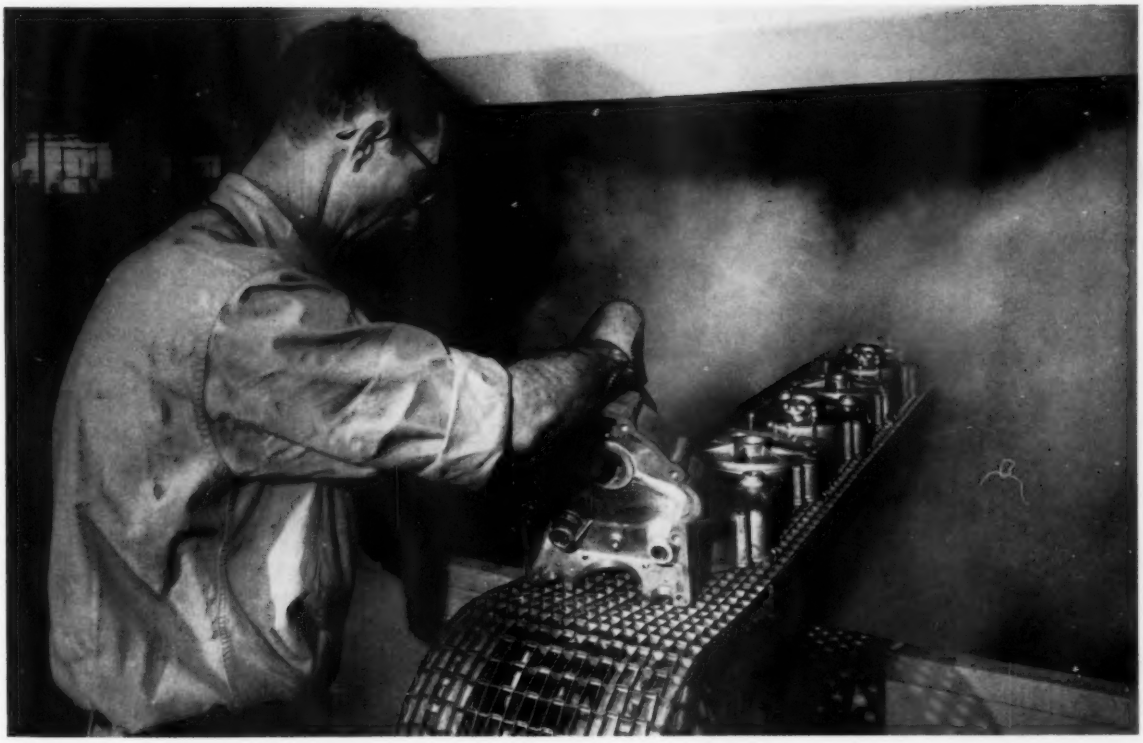


Fig. 1. Machine castings emerging from 10-ft long conveyor are cleaned in less than 15 min. Old method took nearly two hours

Cleaner Comes to Castings, Breaks Bottleneck

By SETH THAXTON, Assembly Supervisor, Gravely Tractors, Inc., Dunbar, W. Va.

TRANSPORTING MACHINE castings from an assembly bench to another floor for cleaning, then back again for assembly, took entirely too much travel time in our plant. So instead, we brought the cleaning bath to the castings and cut the cleaning time from 1 hour 45 min to 15 min.

The castings consist of 30 different tractor attachments. including a rotary plow, rotary cultivator, gang and reel, rotary and sickle mowers, chain and circular saws, snowblowers, snowplows and others.

Our traditional method of handling the cleaning operation was a case of Mohammed going to the mountain—we received the castings at our second-floor assembly area, loaded them on a flat truck, hauled them to the elevator, lowered them to the first floor, and trucked them to a trichlorethylene degreaser. Then we put a dozen castings at a time into a wire basket and lowered it into the 185 F degreasing solution for a five-minute bath, removed the castings, trucked them back to the elevator and to the assembly benches above, for a 45-50 min operation in all.

So much for the oil and grease. To rid the castings of machine grindings required another 45 min of compressed air blasting.

We had considered steam cleaning, but always were under the impression that the lack of available space and the comparatively remote location of our assembly area barred us from having this kind of equipment. Then, too, we had only 50 to 60 castings to process daily.

A steam vapor cleaner and an enclosed conveyor system eliminated Mohammed's travel time entirely. The steam cleaner, made by Malsbary Manufacturing Co. of Oakland, Calif., has two cleaning guns specially adapted for stop-and-go operation. It can deliver 180 gph at up to 100 psi, requires an area 63 in. by 36 in. for installation. For use with the cleaner we constructed a metal box 4 ft wide, 8 ft long and 7 ft high around a stainless steel conveyor 10 ft long and 12 in. wide. The two cleaning nozzles were installed in the box to spray hot water and detergent from positions 12 in. above and 12 in. below the conveyor. The entire arrangement was installed about 30 ft from the assembly benches to eliminate the transportation problem altogether. Now 60 castings per day roll through the cleaning operation in less than 15 min.

The cost of our new arrangement proved economical even though at this time the steam vapor cleaner operates only one 15-min period per day. (It reaches operating temperature in 90 seconds from a cold start.) In addition to the big time savings, we also save a respectable quantity of water, gas, and cleansing material. Even though the cleaner's output is primarily hot water, it uses less water than the trichlorethylene solution, or about 50 gal per week along with 7 lb of detergent. **End**

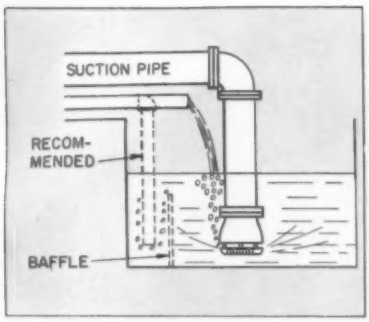


Fig. 1. Recommended baffle will prevent water falling directly on inlet

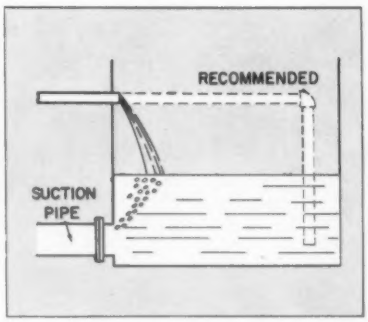


Fig. 2. Extending inlet maximum distance from suction stops air entry

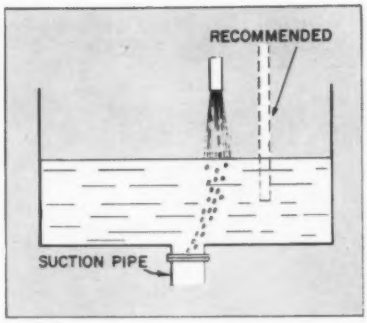


Fig. 3. Pressured discharge entering vertically, carries air to pump suction

Centrifugal Pumps—

Recognizing and Preventing Air Entrainment

When it's done in a centrifugal pump, the practice of pumping a mixture of liquid and gas is a bad one . . . Author tells how you can recognize the symptoms of air entrainment, and what you can do about them . . . Inlet piping is often the culprit, and is easily changed

By E. SCHWANDT, Application Div., Goulds Pumps, Inc.

CENTRIFUGAL PUMPS are not designed to operate on a mixture of liquid and gases. Such operation leads to serious mechanical trouble, shortened life and unsatisfactory performance. Reduced capacity results from the presence of even small quantities of air. For example, only two per cent free air can cause ten per cent loss in capacity.

In addition to serious loss in efficiency and wasted power, pumps handling a mixture of liquid and gases are noisy, with destructive vibration. Shaft breakage, loss of prime and accelerated corrosion are other frequent results of entrained air.

Improperly packed stuffing boxes, inadequate seal on suction lift, leaky suction lines or inadequate submergence may lead to the presence of air in the liquid being pumped. The remedies for these conditions are obvious and while considerable effort is often expended to correct them, all too frequently another common source of air is neglected—free discharge of liquid above the surface, at or near the pump suction inlet pipe.

In Fig. 1, liquid falling directly on the foot valve would carry air into the suction line and could result in the pump losing its prime and seizing while running dry. Figure 2 illustrates a pump with flooded suction. While the depth of air penetration may appear to be negligible, water current and unseen vortices can draw a considerable amount of

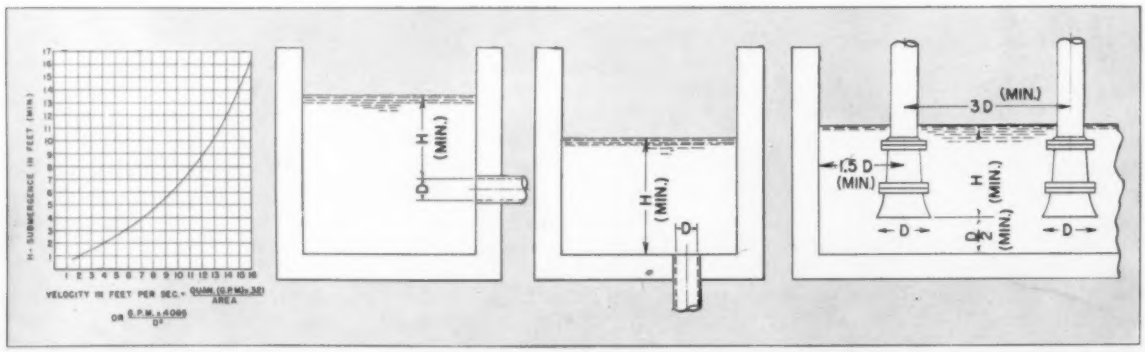


Fig. 4. Graph, left, gives optimum velocity at which fluid can enter to prevent air entrainment, at various inlet depths

air into the pump, and pump operation would undoubtedly be noisy.

Illustrating even more effect in causing entrained air than a free fall, Fig. 3 shows a line discharging vertically downward under pressure, such as an underground orifice return line to a feed water storage tank.

To minimize air entrainment, baffles as shown in Fig. 1 allow the air to separate before entering the pump suction. The return line should be extended far enough away from the pump suction to prevent trouble,

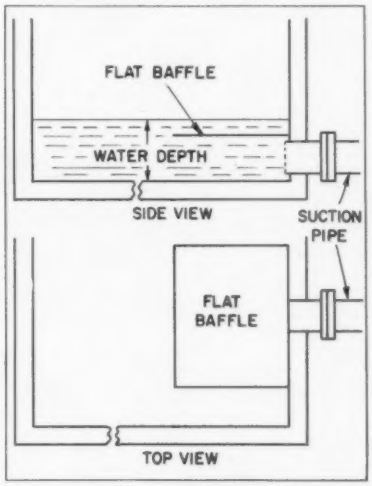


Fig. 5. Plan and section views of baffle installed to prevent vortex formation

and be terminated below the surface of the water.

Either the installation of suction pipe that is too small in diameter and/or too shallow submergence of the end of the suction pipe frequently causes entrained air conditions. If the velocity of the water at the suction pipe entrance is too high, a vortex is created through which air flows downward to the end of the suction pipe and into the casing. Such entrainment of air can be avoided by selecting and installing a suction pipe through which the fluid handled enters at a velocity not exceeding that shown on the graph and illustrations in Fig. 4. Lower velocity and higher submergence will usually eliminate this trouble.

In some cases, however, it is impractical or impossible to locate a pump so that its suction pipe can be properly submerged as described above. Fig. 5 illustrates an inexpensive and easy way to prevent air entrance to the pump suction through a vortex. A flat baffle or roof installed as shown, reaching out into the reservoir, will reduce the velocity below the danger point.

Figure 6 illustrates two other methods of accomplishing the same result. In one, a larger diameter section of pipe inside a shallow reservoir is used with slots cut into the lower third of the pipe well. The open area of the slots should equal two to three times the area of the pump suction pipe itself. In the other, a simple welded baffle which can be made from scrap sheet metal in any maintenance shop will usually help smooth out a vortex. The size of the baffle will depend, of course, on the suction pipe diameter and the depth of liquid in the tank. Although the application illustrated shows the baffle for use where the tank is above the pump, the same principle holds in other illustrations where a vortex forms at the suction.

Two simple tests for the presence of air in a centrifugal pump can save time, inconvenience and expense. After calculations have been made to be sure that the NPSH available is greater than that required by the pump to prevent cavitation, one of two tests should be used depending on the suction condition.

If the source of suction supply is below the centerline of the pump, then the pump is operating on "suction lift." If this is the case, the operating or "gravel" noise caused by the presence of air can be reduced or eliminated by the addition of more air. *This should not be considered a remedy.*

The first stage suction chamber will always be below atmospheric pressure in a pump operating on suction lift, and the introduction of

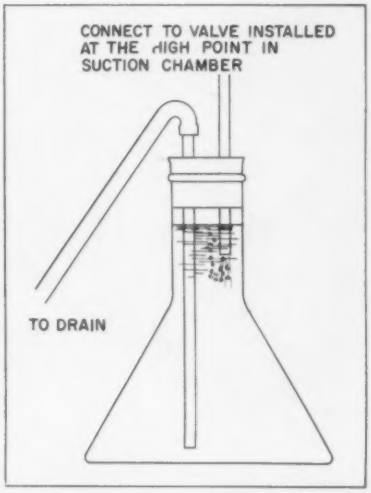


Fig. 7. Bottle test to evaluate entrainment. Inlet is from pump suction

additional air is relatively simple. Most pump casings include tapped and plugged openings in the suction chamber or gauge connections on the suction flange. A needle valve can be installed very simply to permit the entry of air.

An even more positive test for the presence of entrained air or vapors can be made when the source of suction supply is above the centerline. In this case the suction pressure is above atmospheric, and the problem of admitting additional air is generally impractical and unnecessary. Since the pressure at the suction chamber of the pump is above atmospheric, a valve can be installed in one of the tapped openings at the high point in the suction chamber and the presence of air or vapor determined by collection in a "bubble bottle," illustrated in Fig. 7.

Both of these tests are simple and can be performed in a few minutes without disturbing piping or production. End

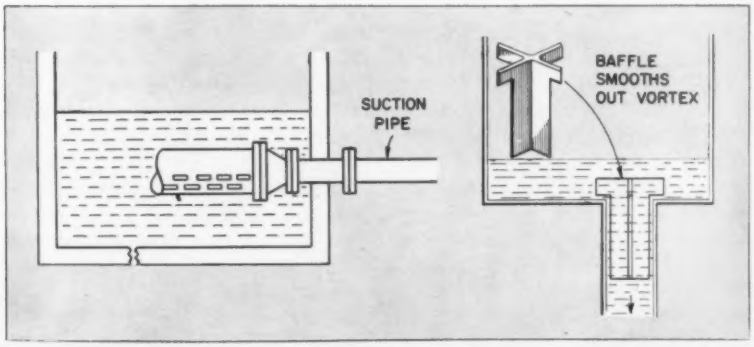


Fig. 6. Two methods of preventing a vortex in vertical or horizontal discharge

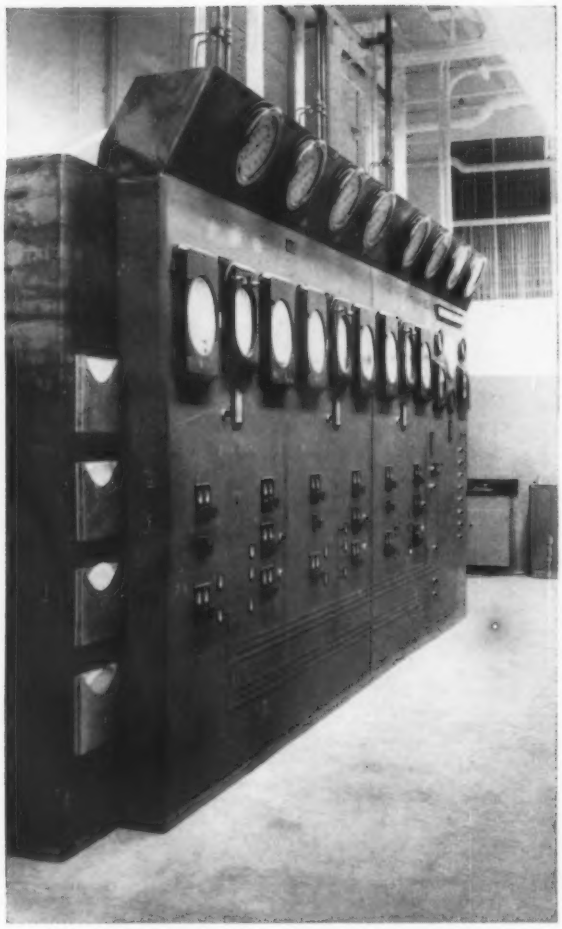


Fig. 1. The three automatic control panels for hot water generators. Despite controls trained operators are needed

Fig. 2. Arrow points to truss-suspended platform on which hot water coils are mounted. Sixty-two platforms are used

HTHW Cuts Big-Plant Heating Costs

Installation Costs Lower With High Temperature Hot Water

SIX MONTHS OF intensive study preceded installation of the high temperature closed-circuit hot water heating system in the new DC-8 jetliner production buildings at the Long Beach Division of Douglas Aircraft Company. To give this study purposeful direction, the Plant Engineering Department at the Long Beach plant posed some practical problems summarized as follows.

"How to heat approximately 56½ million cu ft of building space efficiently and economically, with economies reflected in the original installation and also in its subsequent operation and maintenance."

These studies brought to light some interesting data. 1. Smaller pipes could be used in the high temperature system than in a conventional low pressure steam system. 2. Although the amount of insulation required on any heating system piping is determined by the maximum operational temperature employed, the smaller pipes would require less total insulation than large pipes. 3. Less overall piping would be required because the heating system radiator coils could be connected in series.

4. Installation of the piping would be less critical as no slopes for drainage, condensate traps, etc., would be required. 5. No condensate return system with its associated pumps, piping, and maintenance, would be required. 6. The closed, high temperature heating system would require a minimum of make-up water after the initial filling of the system. 7. System scale (and thus maintenance) would be minimized by demineralizing the initial water and subsequent make-up water.

Due also to the fact that this water was circulating in a closed system, no new (or at least, very

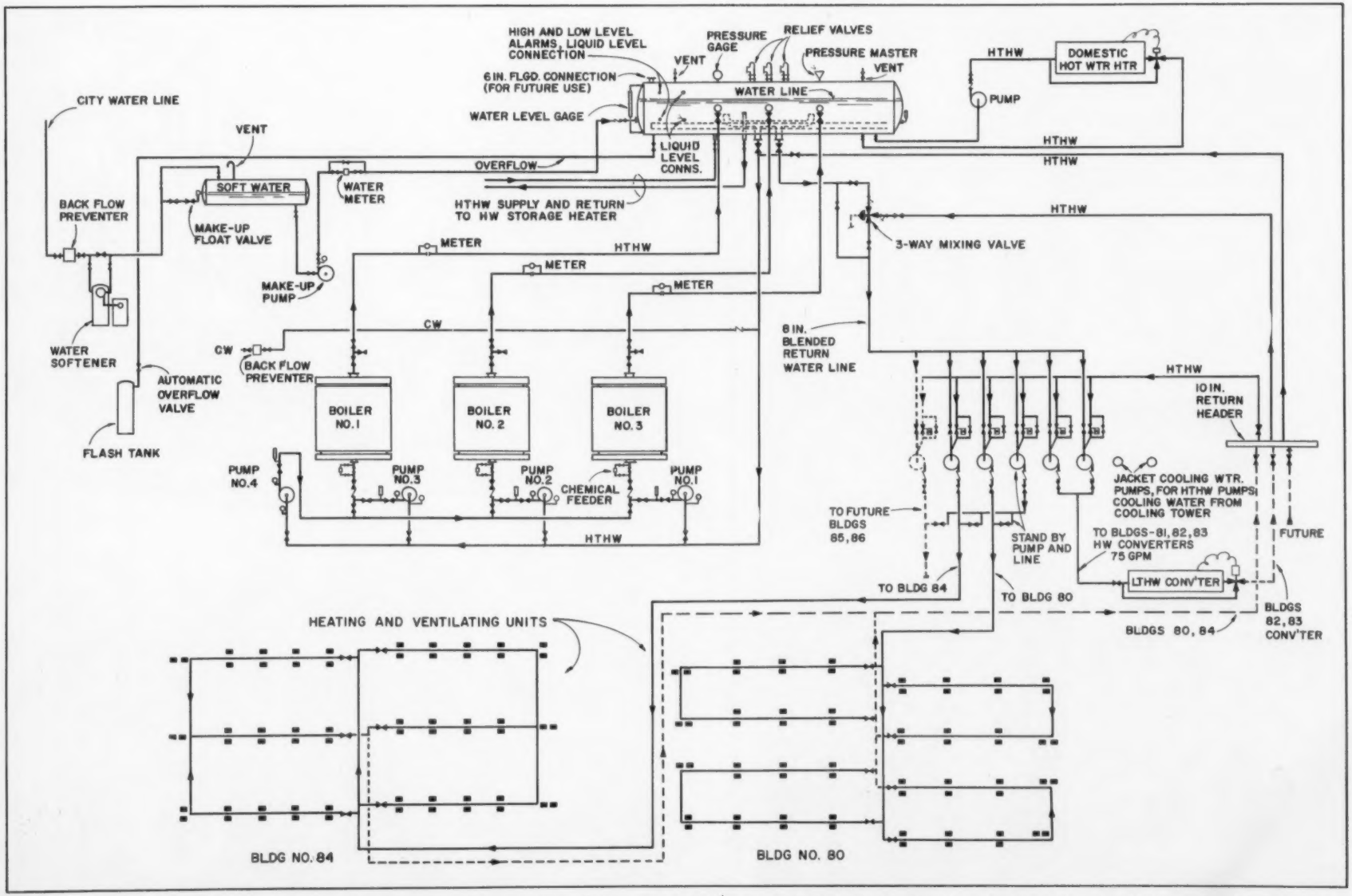


Fig. 3. Single-line diagram of the high temperature water heating system. There are 124 hot water coils throughout present system located on 62 platforms as shown in Fig. 2

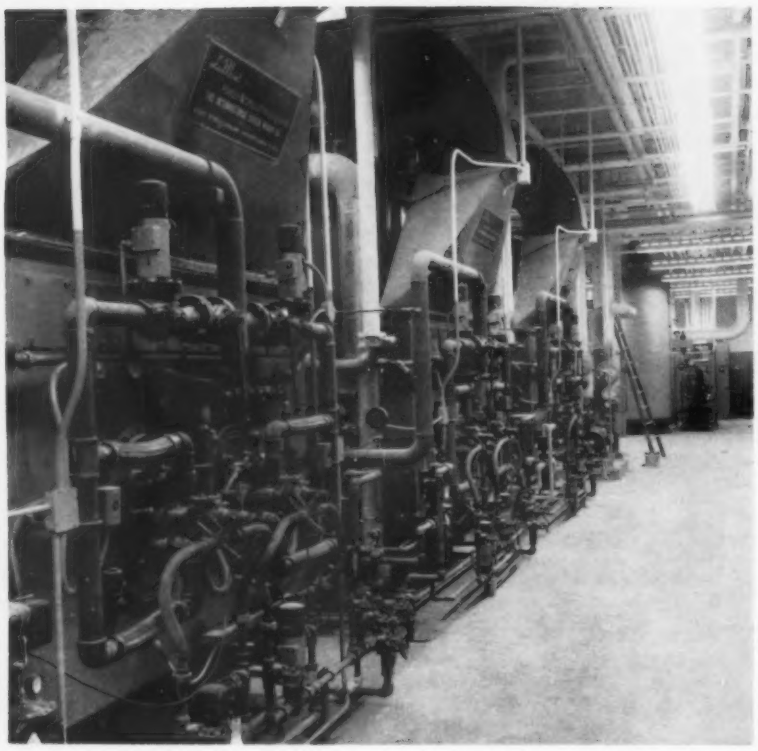


Fig. 4. View of the three gas-fired hot water boilers which supply water to system

few) minerals or scale-forming material would be introduced.

With these cost-saving factors as a guide, and aware of the fact that similar closed-circuit, high temperature hot water heating systems had been employed in several large Eastern industrial plants, and also in the buildings at the new Air Force Academy in Colorado, the Long Beach Douglas Plant Engineering Department proceeded to plan and install the system.

The system would have to heat two large production buildings and several smaller associated service buildings. Three separate systems were used, one for each of the larger buildings, and one for the smaller buildings.

Three hot water generators, each with an output of 36,000,000 Btu per hour, were installed in the boiler room. Water is furnished to the heating system at 400 F, and 250 psi pressure. Conventional gas firing is used, with an oil standby. Each generator has its own automatic control panel which cuts it in or out of the system as required. Recording instruments on each control panel maintain a continuous operational record. When trouble occurs in any one of the three circuits, a light flashes on the control panel and illuminates a printed sign which states the nature of the trouble and its location. As an added convenience, a complete diagram of the heating circuit it controls is laid out on each control panel.

Three pumps in the furnace room, each driven by a 20 hp motor, provide forced circulation to offset line friction. Maximum temperature drop of the water as it circulates through the closed system is 180 F.

Heat is transferred into the two large production buildings and the smaller service buildings from a total of 62 platforms mounted in the roof trusses, each containing two radiator heating coils. Each heating coil has an output capacity of 720,000 Btu per hour. Circulation is assured by a fan in each heating unit with a total output of 48,000 cfm.

While providing heat, approximately 25 per cent of the air forced through the heating coils is drawn in from outside through roof ducts. When heating is not being employed, the same fans draw 100 per cent of their air supply from the outside, thus effectively cooling the buildings. However no cooling system is incorporated for this outdoor air supply.

The plant engineering department points out that the savings revealed in the prior studies are accruing true to form. Total water capacity of the system is 25,000 gal. Make-up water amounts to about 20 gal per day, with this slight loss accruing from leakage at the packing glands in the system. It should be noted here, also, that the inherent ability of a closed system to conserve water is very important in the Southern California area. And, of course, as no condensate return system was needed, considerable savings accrued both during installation of the system and its maintenance.

While planning the system, the plant engineering department went the old proverb one better and "killed *three* birds with one stone." Two heat exchangers, both fed by the high pressure, high temperature system, were installed, one to furnish low pressure hot water for heating the offices, and one to furnish hot water for domestic use. Each heat exchanger is thermostatically controlled by means of a valve which limits the amount of high temperature, high pressure water admitted to produce the necessary output. The output from the heat exchanger used to heat the offices is in the form of low temperature hot water. The output from the heat exchanger furnishing domestic water is limited to hot water at 140 F.

When asked to comb his mind for some inherent disadvantages of closed-circuit, high temperature, high pressure hot water heat, R. T. Alexander, foreman of the department, could come up with only one suggestion. He pointed out that only trained operators should be used to monitor system operation. "While the system is fully automatic in operation, automatic devices have a way of failing at crucial moments," he said. "When this happens, the operator in charge should be able to discover the trouble and correct it immediately. If, for instance, due to some sort of system failure, water would cease to circulate through the generator tubes, the stagnant water in the tubes would turn to steam and the generator tubes would be burned out in about three minutes." **End**

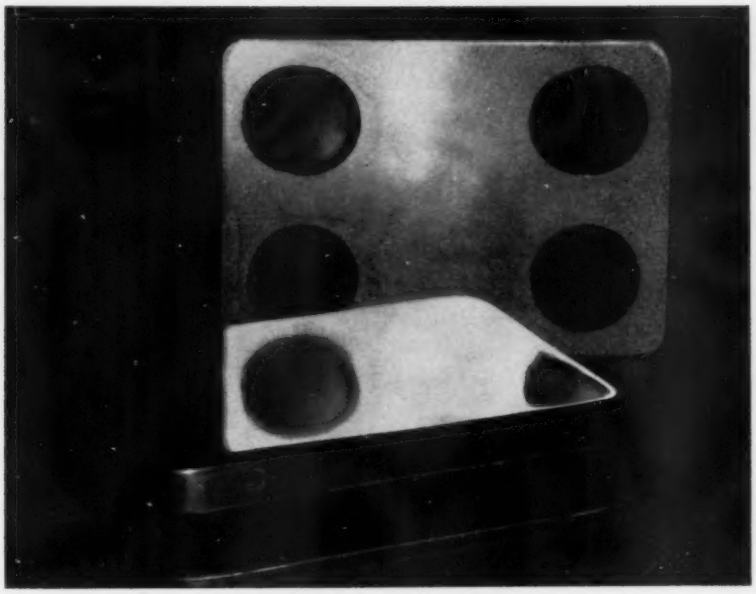


Fig. 1. Rubber is bonded to plates of steel. The purpose of the four pads protruding through the bottom plate of a typical mount is to help keep the machine from sliding when it is not anchored to the floor with bolts

Rx for Machine Shakes

Sandwich Type Mounts Damp Equipment Vibrations

By W. E. SEALES, Superintendent of Maintenance, F. H. Maloney Co., Houston, Texas

WE WERE continuously having vibration problems with our machines and decided to do something about it. With the cooperation of our Research and Development Laboratory we designed and made the type of mount we are using. See Fig. 1.

The mounts were made with two pieces of steel plate; the top plates are 3/8 in. thick and bottom plates 1/16 in. with four 1-in. diameter holes in the latter. Rubber is bonded to the plates, protruding through the holes in the bottom plate for contact on the floor. Hardness and type of rubber is controlled.

We drill and tap into the plate for securing the machine to the mount. If necessary, to bolt the machine to the floor, we drill a hole through making it large enough to clear the bolt. By using a rubber washer or grommet under the head of the bolt we can tie the machine down and still have damping. Some applications do not require any bolting.

We have used these mounts satisfactorily under lathes, grinders, drill presses, and shapers. **End**

Fig. 2. Author points to one of the vibration dampers under a machine tool in his plant. The mount has been drilled all the way through for anchoring

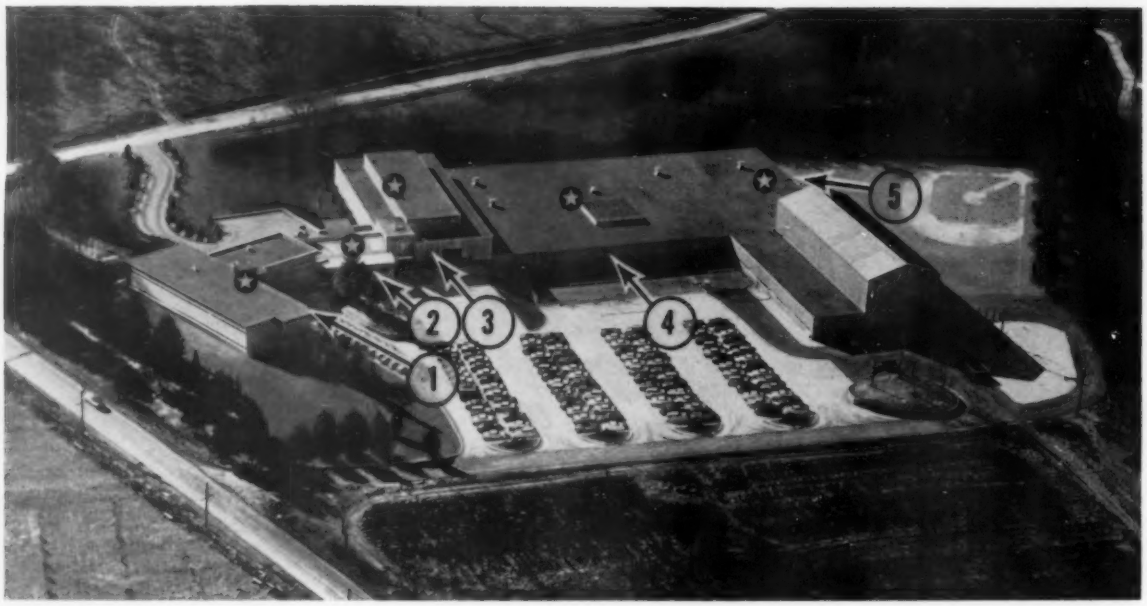


Fig. 1. Arrows indicate locations of the five gas-fired water heaters at the Selas plant. The stars on the roof are above the approximate location of each heater. Hot water is supplied for general purpose use and special process mixing

Point-of-Use Hot Water System

Five Heaters Take Care of Each Department's Particular Needs

ALTHOUGH THE Selas Corporation of America uses a central heating system to supply steam heat for their administrative and engineering buildings, hot water for use throughout the plant is supplied by five heaters located at specific locations in the plant.

The reasons are plain when you consider that the plant's large boilers would run the cost of air conditioning to an unnecessarily high rate if they were kept burning all summer to supply hot water needs.

Since the whole plant is not air conditioned, steam lines would have had to be run long distances to supply the scattered use points for hot water which would be uneconomical.

Besides, a large amount of general purpose water is required for rest rooms, laboratories and the plant kitchen. Hot water is also needed for process mixing.

Five Ruud gas-fired water heaters take care of the job of heating water for the following locations:

1. One unit supplies hot water to the administrative and engineering offices.

2. Another unit supplies 180 F water for the dishwasher as well as 140 F general purpose water in the cafeteria kitchen.

3. Hot water is also needed in the laboratory, dispensary and for darkroom use. In the laboratory building it is used for cleaning and quenching experimental parts. The photo laboratory requires hot water for the mixing and temperature control of photographic solutions. In addition, the dispensary must always have clean hot water available.

4. A multi-coil hot water unit is used to heat a 1,500 gallon storage tank to take care of several small washrooms and the main washroom in the manufacturing area.

5. A hot water unit is also used in the ceramic and high-temperature brick departments. In these departments, special sands and chemicals are mixed to make high temperature brick and burner parts as well as manufacturing ceramics. **End**

Fig. 2. Unit supplies hot water for mixing clays for ceramics production

Industrial Thermometers—

Helpful Data Will Guide Your Selection of Proper Instrument

By W. C. DILLON, JR., Engineering Manager, Test Laboratory, W. C. Dillon and Company, Inc.

TEMPERATURE measurement is becoming increasingly important as industrial equipment grows more complex and is pushed toward higher temperature operation. This condition has made it necessary to have sufficiently accurate temperature indicating instruments which allow constant, close observation of thermal levels to avoid damaging expensive equipment.

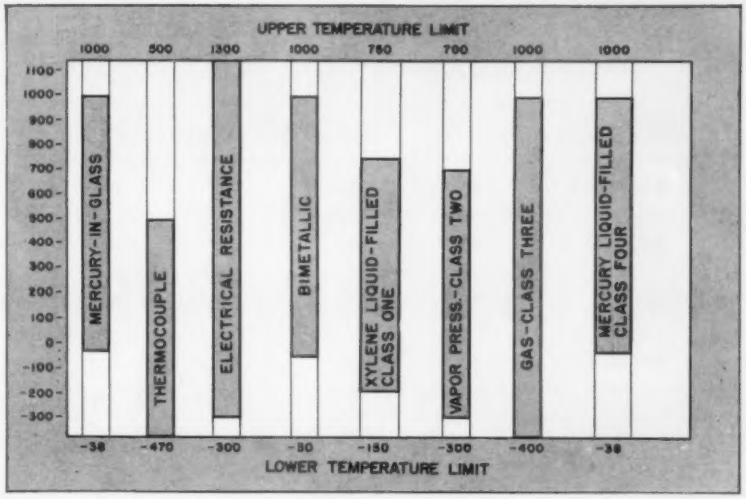
With so many temperature measuring devices at the engineers disposal, it is oftentimes difficult to determine what type and quality of instrument he needs for his specific application. A combination of qualitative and quantitative information concerning the most commonly used thermometers should aid the plant engineer in selecting the appropriate thermometer.

All selection of thermometers may be simplified by following this analysis. Many problems of thermometer selection will not be as simple, but by following such a method, any necessary compromises will become immediately apparent, greatly aiding the selection of the least expensive and most efficient instrument for a specific application.

In general, there are four considerations which must be taken into account by the engineer before he can select the appropriate thermometer. These are: temperature range, accuracy required, reliability and ruggedness necessary and costs.

There is no completely automatic way of selecting a thermometer. Unless funds available for instruments are unlimited, certain compromises will have to be made. On the other hand, if a wide range of accuracy can be tolerated instrument costs can often be extremely low. The following outlines the various characteristics of the most commonly used thermometers. This together with the accompanying comparison tables will aid in selecting the proper instrument.

Table I. Upper and lower temperature limits of the different types of thermometers



The types of thermometers which give direct reading and are in general use in industry include: 1. Liquid in glass; 2. Thermocouples; 3. Electrical resistance; 4. Pressure-Actuated; and 5. Bimetallic strips and coils.

Although there are many other techniques and devices used to make temperature measurements, these cannot be classified with those used in general applications in industrial equipment. Some of these other devices are: Optical or radiation pyrometers, pyrometric cones, and airflow orifices.

Liquid-In-Glass Thermometers—Utilizing the thermal expansion characteristics of certain liquids, liquid-in-glass thermometers cover limited temperature ranges within the overall range of -170 to 1000 F. The standard mercury thermometer which is generally used in industrial work is manufactured to include various ranges within the -38 to 1000 F.

However, when liquid-in-glass thermometers are used at temperatures above 300 F, the glass has a tendency to distort if it has not been properly treated during manufacturing. Precision glass thermometers which have been constructed with a high-quality glass and annealed properly can vary in readings by as much as 0.2 F depending on temperature. Variations of this type with poor quality glass may be as high as 30 F when the thermometer is heated to 500 to 600 F for any length of time.

There are also some hysteresis effects in glass thermometers that occur with alternate heating and cooling due to characteristics of glass. This hysteresis variation can be considered to be in the area of 0.01 F for every 10 F the thermometer is heated above its normal or

starting temperature for quality glass. In general industrial-type, in-glass thermometers have accuracies which are sufficient for most needs. Their primary disadvantage is fragility. For this reason they are not usually used in permanent installations.

Thermocouple Thermometer—Thermocouple temperature measurements are based on the electrical potential variation that occurs when certain dissimilar metals, in contact, experience temperature changes. These potential variations are measured and calibrated to temperature measurements. Thermocouples for industrial use present some of the most accurate measurements, although by comparison to in-glass thermometers and bimetallic coils they are considerably more elaborate.

Most temperature instruments for installation in industrial equipment do not require accuracy greater than ±1 to ±5 F, which is provided by in-glass or bimetallic instruments. In order to make thermocouple measurements, it is necessary to have additional instrumentations such as voltage source, standard cell, potentiometer, and galvinometer scale.

Among the advantages of thermocouples is the fact that the actual reading of thermocouple temperature measurements can be made at locations remote from the sensitive element. Thermocouple measurements are sometimes more convenient to use when measurements must be taken in areas that cannot be reached except by flexible wires. As a further advantage, the same thermocouple indicating instrument can be used to alternately read temperatures from almost any number of individual elements covered by the range of the instrument.

In special applications thermocouples have been used in various ranges within the near absolute 0 to 5000 F. Many different metals can be used for thermocouple elements. Temperature range will be dependent on the wire materials, wire thickness and instrumentation calibration.

Electrical Resistance Thermometers—Electrical resistance thermometers work on the basis that the resistance of an electrical conductor changes as surrounding temperature varies. Like the thermocouple unit, this device requires special instruments for measuring resistance changes which are translated to a calibrated temperature scale. Electrical resistance thermometers are highly accurate devices when used in conjunction with highly precise instrumentation of laboratory-standard quality. This temperature measuring device can also be used for remote indication of alternately sampled temperatures.

Resistive sensor elements are usually fabricated from platinum, nickel or copper. Platinum elements are used in the range of about 260 to 1300 F; copper elements -40 to 250 F; and nickel elements -300 to 600 F. Within the range of platinum elements, resistance thermometers are considered more accurate than thermocouple devices. However, for high accuracy, extreme care is required in manufacturing the instrument and the sensing elements, which are not very rugged. Such equipment is generally not used in industrial applications. Instead more rugged, considerably less accurate instruments of this type are available.

Pressure-Actuated Thermometers—Pressure-actuated thermometers are made up of metal bulbs filled with thermal sensitive materials which usually exert a pressure on a Bourdon tube, spring or bellows, through a capillary tube, to indicate temperature measurements. This general type of thermometer has been classified, by the Scientific Apparatus Makers Association, into four categories:

Class I is a liquid-filled system (any liquid but mercury). This type of instrument is generally limited to 750 F.

Class II is a vapor-pressure thermometer. The range for this type of instrument is generally confined to a 200 to 300 degree span for any particular liquid within -20 to 750 F range.

Class III is a gas-filled system

(Continued on page 204)

Table II. Overheating, undercooling, impact test and length of use are indicated

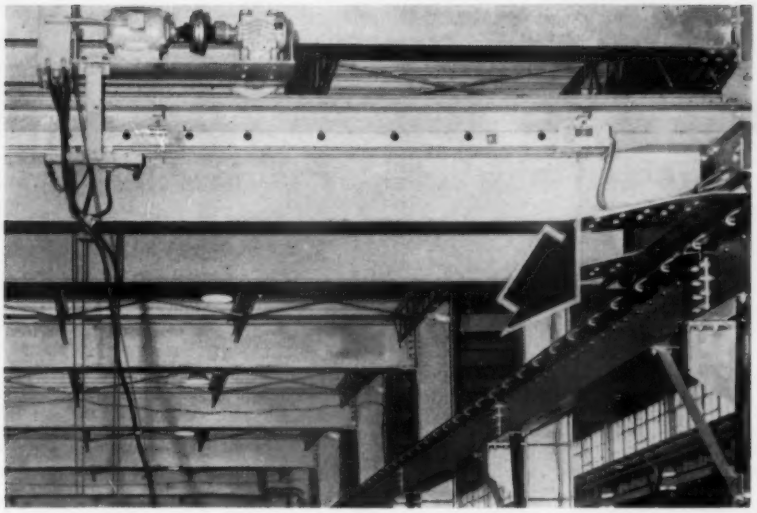
THERMOMETER TYPE	OVERHEATING (50% SCALE)	UNDERCOOLING (50% SCALE)	* IMPACT TEST	CONTINUOUS USE (1 YEAR)
MERCURY-IN-GLASS	C	B-C	C	B
THERMOCOUPLE	A	A	C	A
ELECTRICAL RESISTANCE	A	A	C	A
PRESSURE ACTUATED	B	A	B	B
BIMETALLIC	A	A	A	B

A - GENERALLY NO EFFECT
B - MAY AFFECT ACCURACY, MAY NEED RECALIBRATION
C - PROBABLY DAMAGE INSTRUMENT
* - DROPPING FOUR FEET TO HARD SURFACE

Table III. Comparative instrument costs

TYPE OF INSTRUMENT	*RELATIVE COST
MERCURY-IN-GLASS	2-5
THERMOCOUPLE	10-100
ELECTRICAL RESISTANCE	10-100
PRESSURE ACTUATED	5-10
BIMETALLIC	1

*COSTS ARE BASED ON THE COST OF BIMETALLIC THERMOMETERS BEING EQUAL TO ONE UNIT



Hook bolts fasten pre-drilled crane rail, giving perfect alignment of rails. When rail wears, bolts can be adjusted where necessary to restore alignment

Where Perfect Alignment Is a Must—

Crane Rails Installed With Hook Bolts

PLANS CALLED FOR two straight runs of overhead crane rail—each the length of a football field—in the new 96,000-sq ft plant of Conveyor Systems, Inc., Morton Grove, Ill. One plant bay is 30 ft wide, the other 45 ft wide.

The company has good reason for the wide open spaces in the erection shop.

"We assemble and test all our conveyor systems before we send them out," explains M. H. Coleman, president of the company. "Suppose, for example, a customer orders a 150-ft-long system. First, our engineers design it. Then, the erection shop takes over. They assemble the necessary gears and sprockets and belts and chains for each dip and rise, each curve and slope of the entire 150 ft of conveyor."

The only problem with the "indoor football field" shop is that the overhead crane—the workhorse of the erection crew—must run on rail that is arrow-straight. Without perfect rail alignment, production would slow to a walk and there would be excess wear and strain on the crane. Virtually all loads are handled by the two fixed-path, five-ton cranes, although small, compact loads (less than two tons) are sometimes handled by a fork-lift truck.

Three hundred feet is quite a long stretch for rail to be installed perfectly parallel. But the company handled it very simply. First, they erected a sturdy rail bed—16-in.-deep, wide flange, steel girders. Then, when L. B. Foster Company of Chicago shipped them the 1,240 ft of pre-drilled 40-lb ASCE crane rail, they included ¾-in. hook bolts made to order to fit the girders.

Fastening Method

Crane rail can be fastened to steel girders in a lot of ways—welding, clips, etc.—but this time it was a good application for hook bolts. A hook bolt is no more than a short piece of bar stock with a hook on one end and a thread and bolt on the other. They are installed in pairs about three inches apart with the alternating hooks reversed: They grip the way ice tongs do.

Here's the way the workmen installed the rail at the conveyor plant. The rail came already pre-drilled with a series of holes in three-inch pairs about every two feet along the web of the rail. Workmen accurately positioned the rail sections on the girder. They fitted a hook bolt around the top flange of the girder and slipped the threaded end through the web of the rail. Then they put on a bolt and ran it up fairly snug.

This procedure was repeated for the other bolt in the pair—except that the second bolt was hooked to the opposite side of the top of the girder. Then workmen moved two feet further down the rail for the next pair of bolts. They continued this way for the complete run of rail on each side of the bay.

Next, they placed the crane on the track and as it was slowly moved along, minor adjustments in rail alignment were made by tightening or loosening the bolts slightly—perhaps half a turn or so.

Not only did this method of installation give a perfect track, but it'll pay off again in years to come. When the rail starts to wear a little in the most highly traveled sections of the plant, the company will not have to tear out the rail to do the job again. Just by adjusting the hook bolts, they can restore perfect rail alignment. **End**

How To Stop D-C Downtime

Reliable Crane Service Provided by Parallel Rectifiers

By R. E. INGHAM, Chief Electrical Engineer, Plant Engineering Dept., J. T. Ryerson & Son, Inc.

CONTINUED functioning of overhead traveling cranes in a plant is essential to a profitable operation. This is particularly true of steel warehouses. Crane maintenance carries the highest priority, as even a short interruption can seriously affect all phases of the business.

Many of the Ryerson plants have two cranes in a span to prevent total shutdown of service in the event of a crane failure. Some plants have three cranes in a given span to properly handle the work load. In these cases, failure of the center crane can prevent full operation of the other cranes in the span.

Although the failure of any crane is a serious matter, the nightmare of all our maintenance men is a power supply outage. With all cranes at a standstill, the entire operation will soon stop. Floor machinery cannot operate very long without a crane to bring in new stock and take away finished orders.

Fortunately, the reliability of the alternating current power supply is very high in all of the plants. The newer plants have cranes operating directly on alternating current and a total power supply interruption would be a rare happening. We consider these plants reasonably safe from a total crane outage unless the incoming line fails.

Several of our plants have cranes operating on direct current. Power is supplied either with a synchronous converter or a synchronous motor generator set. All of this equipment is very old and, although it receives the best of care, could fail at any moment.

Plant A in the table has an old synchronous converter supplying power to two d-c cranes. As part of a planned program to improve reliability, there are a-c cranes operating in the same spans with the d-c cranes. Failure of the converter would handicap the operation but would not stop it entirely.

Plant B has six cranes operating on direct current. This plant is a little more critical because three of the spans have only one d-c crane per span and one span has two d-c cranes. There are no a-c cranes in these spans to help out in the event of a generator failure. The sixth crane is located in a span that also has an a-c crane.

The power supply consists of two separate motor generator sets. Either m-g set can handle the load and they are operated alternately to even out the wear. The generators have different characteristics and cannot be operated in parallel. A transfer switch is provided in the main switchboard to prevent possible damage due to accidentally placing both m-g sets in parallel.

We do not consider either of these two plants critical because alternate provisions are available. However, we do have two plants where no alternates are available.

Plant C has seven d-c cranes dependent upon a 300-kw generator driven by a 400-hp synchronous motor The generator set is over 40 years old and is not considered reliable. Failure of this d-c source interrupts production in five out of

This Is The Problem

Plant	D-C Cranes	D-C Source	Condition	Alternates
A	2	Synchronous Converter	Unreliable	A-c cranes in each span
B	6	2 m-g sets	Rebuilt 1955	Load can be carried on either m-g set
C	7	1 m-g set	Unreliable	None for 5 spans
D	5	1 m-g set	Unreliable	None for 2 spans

Plants "C" and "D" are obviously in trouble if their d-c power source fails. In plant "C", seven cranes will be out of service in the five spans. This completely curtails production in over 60 per cent of the plant area. In plant "D", five cranes are affected in two spans shutting down all operations in over 70 per cent of the plant area.

Here Is The Solution

Here is the revised tabulation after all work has been done to provide reliable crane service in the two plants.

Plant	D-C Cranes	D-C Source	Condition	Alternates
C	7	2 m-g sets	Rebuilt	Load can be carried on either m-g set
D	5	3—35 kva rectifiers	New	Load can be carried on two rectifiers

Fig. 1. Crowded conditions in generator room prevent installation of standby m-g set. Main d-c panel is obsolete

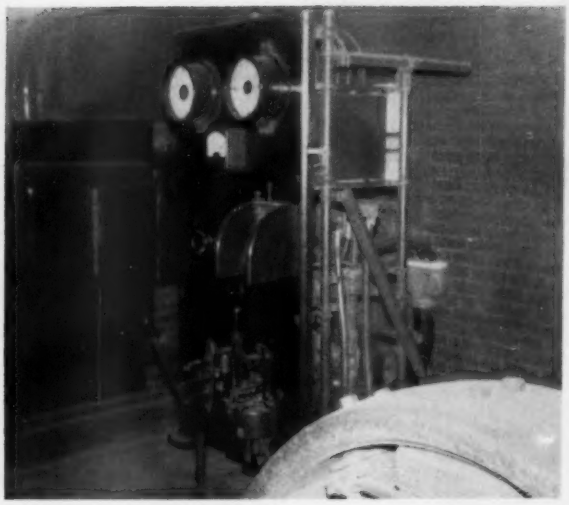


Fig. 2. Starting panel for synchronous motor on m-g set requires experienced operator to prevent tripping main breaker

the eight spans in this plant. No alternate sources of d-c are available and consequently this plant is critically dependent upon the continued operation of the motor generator set.

Plant D has five d-c cranes, operating from a 200 kw generator driven by a 300-hp synchronous motor. Two out of the three spans in this plant would be completely shut down in the event of generator trouble. This generator is also around 40 years old and subject to failure at any time.

The generator sets at plants C and D are running lightly loaded. The 300-kw m-g set at plant C carries a load averaging less than 200 kw. The 200-kw m-g set at plant D carries a load averaging less than 100 kw.

Both plants have a kva billing demand in their power rate schedule and it is important to maintain very high power factor to avoid penalties. The lightly loaded synchronous motors on the generator sets provide sufficient kvar correction to maintain power factor close to unity in both plants.

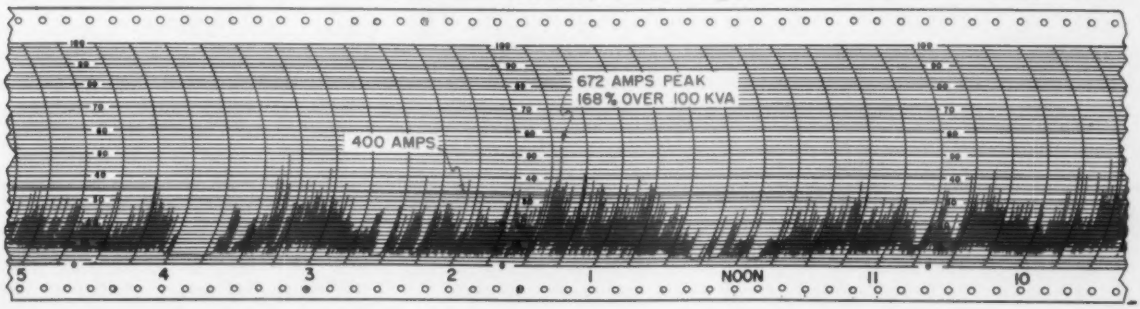
Simply stated, our problem was to provide reliable or alternate sources of d-c power at both plants at a minimum cost. A second, new or used, generator at each plant would provide the necessary alternate power supply. This plan would be expensive and space limitations at plant D would not permit the installation of a second m-g set without extensive building changes.

After considering many plans, it was finally decided that we would transfer the 200 kw m-g set from plant D to plant C. This machine would readily fit into the present generator room next to the existing 300-kw set. As the load at plant C averages somewhat less than 200 kw, it was planned to run the 200-kw generator and maintain the 300-kw set as a standby. This would reduce the lightload losses considerably.

About the only problem to be considered in this change was the effect on the power factor. The motor on the 200-kw m-g set would be more heavily loaded than the larger set and consequently would not be capable of delivering as much power factor correction to the line. This problem will be continuously studied to determine the economics of running the larger set with its losses or keep the small set on the line and supplement the power factor correction with shunt capacitors.

The small generator room at plant D prevented the installation of two generators so some method had to be devised to obtain reliability without increasing the space requirements. As part of the overall plan, it was decided to install three packaged rectifier units operating in parallel. These were to be sized so

Fig. 3. Graphic ammeter chart of d-c crane load is used to study average and peak current demands to specify rectifiers



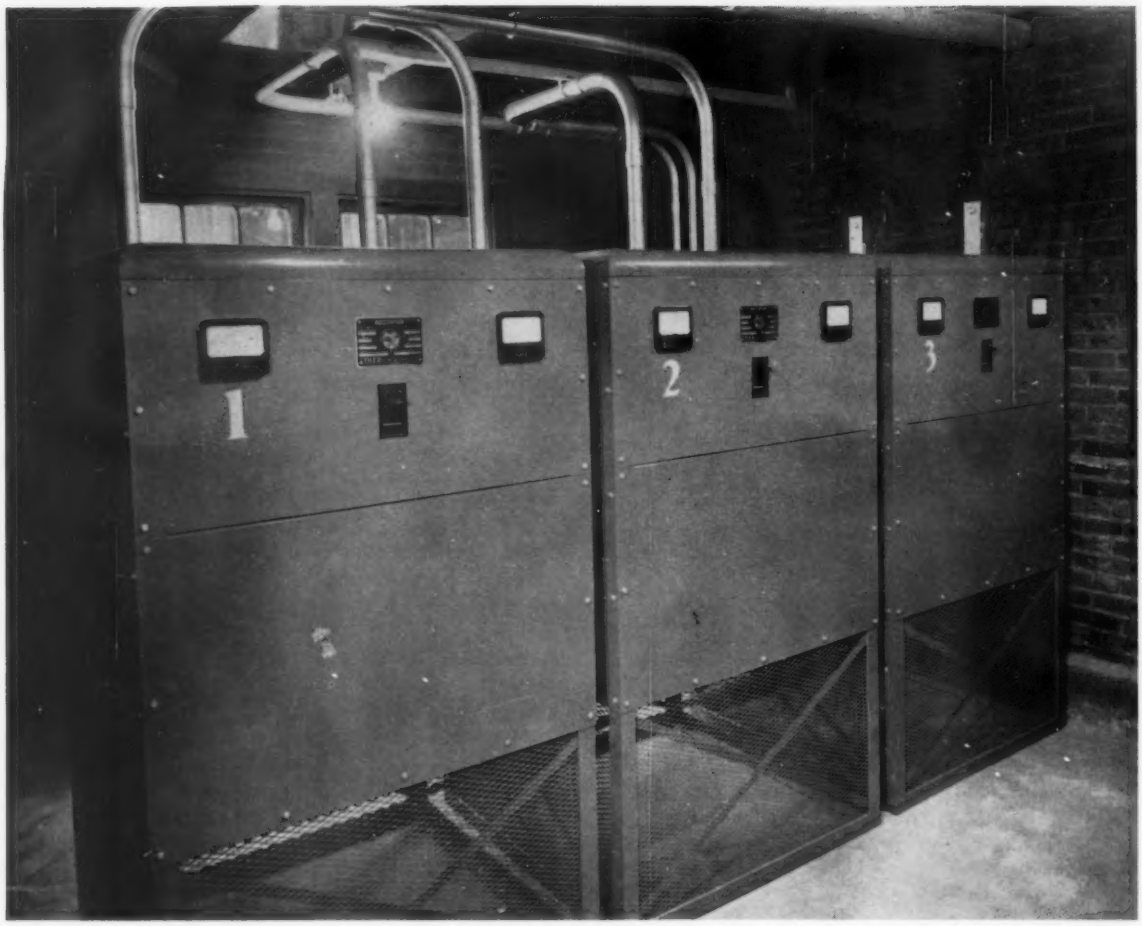


Fig. 4. Three, 35 kva, three phase rectifiers occupy about one half the space formerly occupied by the m-g set and control

that failure of one unit would not interfere with normal operation of the plant.

Motors totalling 260 hp are installed on the five cranes in plant D and the connected load is 1058 amperes. Experience at other plants indicated that we could expect a load factor of 20 to 25 per cent of the connected load. Based on a 25 per cent load factor and 1058 connected amps we would require a rectifier capable of furnishing 264 amps continuously and still provide for peak instantaneous currents.

To provide additional information on the characteristics of the load we asked the power company supplying plant D for assistance. They installed a graphic ammeter on the line and furnished charts of the load. Examination of these charts indicated that the average load was less than 400 amps and the peak current was 672 amps.

This information was relayed to the rectifier manufacturer. Their engineers recommended three 35-kw units capable of delivering 450 amperes continuously. The peak current of 672 amps would be a 50 per cent overload and is within the recommended overload rating of the bank. This is based on a conservative rating and could occur frequently without affecting the life of the rectifiers.

Three Rectifiers Installed

Peak current of 672 amps on two units with a capacity of 300 amps would be satisfactory for emergency use. Repairs to a defective unit should be made rapidly as continued operation on two units would probably accelerate the aging of the rectifiers.

Three rectifier units would fit into the same floor space as the 200-kw m-g set. The bulky, reduced voltage starter for the 300-hp motor and the d-c control panel would be eliminated, reducing the congestion in the switchroom.

Each rectifier has its own a-c line switch and d-c load switch to permit fast isolation of a defective unit. Repairs can then be made while the other two units carry the load.

Installation of the three rectifiers solved the problem of how to gain reliability within a small generator room but it also led to other problems. The 300-hp synchronous motor on the 200-kw m-g set had been providing power factor correction estimated at 75 to 102 kilovars, depending upon the load on the generator.

The rate schedule at this plant is based on a kva demand and anything less than unity power factor results in a penalty. For the year 1956 we had accumulated penalties

totalling $153.37, indicating less than unity power factor under the existing conditions.

To compensate for the loss of the synchronous motor we suggested the installation of 100 kvar of shunt capacitors. As the distribution system in this plant is quite heavy and the voltage level satisfactory, the most economical installation of capacitors would be close to the power source. Again we ran into the problem of space. The capacitors would not fit into the existing switchroom and would have to be installed out in the plant.

Studying this problem a little further we found that the principal cause of poor power factor was a 200-hp motor driving a friction saw. The duty cycle on this equipment is very low and the motor runs on the line for long periods drawing about 20 hp. The resultant poor power factor caused high penalties.

We decided to install the capacitors in three small groups to gain the maximum advantage from the correction and reduce the cost of the installation. One 30-kvar bank was connected to the load side of the friction saw starter and was switched into the circuit when the saw motor was running.

This method saved the cost of the switch required ahead of the capacitor bank. In addition, it prevented excessive kilovar supply and high voltage when the saw was not operating. There is no advantage to a leading power factor as the power company meter has a ratchet to prevent reverse rotation.

A second bank of capacitors rated at 30 kvar but with provision for an additional 15 kvar was installed at the friction saw power panel. This unit is connected through a safety switch and remains on the line. A third bank rated at 45 kvar was installed at the plate shear power panel. This is similarly connected through a safety switch and remains on the line.

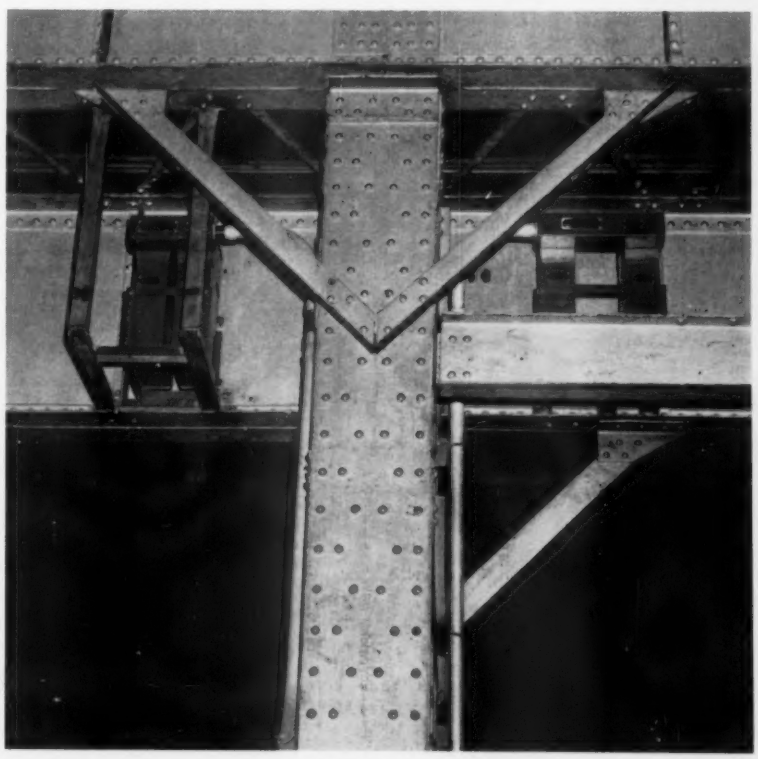
We now have 105 kvar connected and provision to readily install an additional 15 kvar if power factor penalties become excessive.

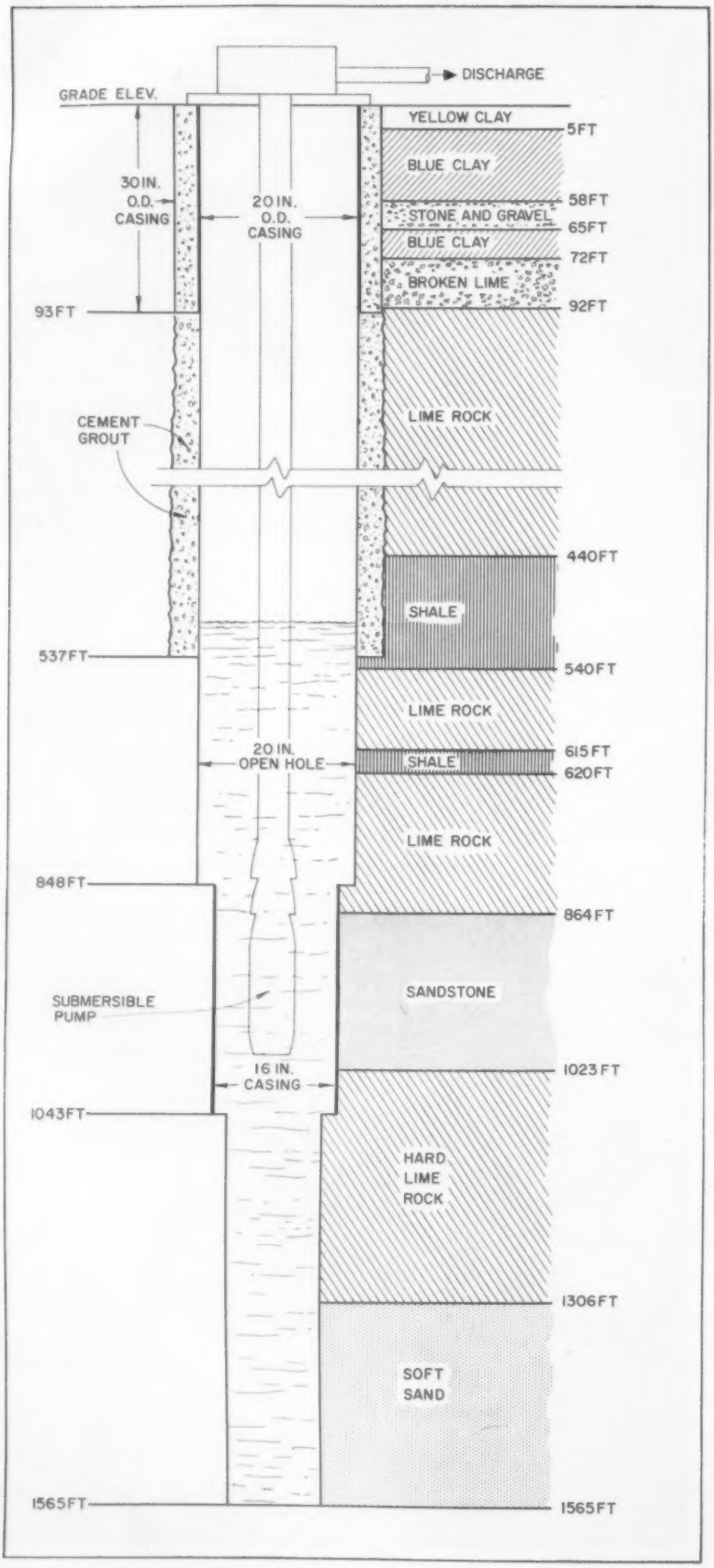
Cost of the three banks of 230-v capacitors was $1,760. The installation cost $1,095. The total cost was $2,855 and with 105 kvar required, it cost $27.20 per kvar. This figure applies only to the 230-v installations as our costs have been considerably less than this on 480-v capacitor installations.

Fig. 5. Three phase input, right, and d-c output, left, on rear of each rectifier

Three selenium rectifiers were delivered to the plant for $6,925, and the installation of the units cost $3,786. This included the removal of the existing generator and revising the wiring to suit the new installation. This brings the total installed cost to $10,711. Based on a rating of 105 kva, the installation cost $102 per kva. **End**

Fig. 6. Capacitors provide power factor correction formerly obtained from synchronous motor. Provisions for adding additional 15 kvar shown in unit at right





Ten-Stage Submersible Pump Supplies Test Cell Cooling Water

BECAUSE THE CITY of Chicago, Illinois, could not supply sufficient water needed for testing jet engines, the Aircraft Engine Division of Ford Motor Company, located on Chicago's southwest side, pumps its own water supply from a 1565-ft deep well, using a 10-stage submersible pump.

Large amounts of water are essential in testing the jet engines because of the high temperatures of the exhaust gases. As these gases are discharged from the afterburner, their temperature ranges from 1200 F to 3000 F. Under these conditions, the standard concrete test cells would soon be destroyed.

To cool the gases, water, at the rate of 1000 gpm at 250 psi, is injected into the exhaust gas eductor tube, lowering the exhaust gas temperature to approximately 450 F, a safe operating temperature. There is a total of 14 test cells. Studies carried out with the Illinois State Water Survey Division showed that there was an ample supply of water available from artesian wells in the locality. The wells would have to be deep with a deep pump setting.

Our plant engineering department, in cooperation with Albert

Fig. 1. (Left) Diagram of strata through which well was drilled. Pump was installed 800 ft below grade; pumping level is at 509 ft. It produces 1650 gpm

By JAMES STEWART
Division Plant Engineer
Aircraft Engine Div.
Ford Motor Co., Chicago

Kahn Associates, made plans to drill one well and to construct an artificial reservoir large enough to provide water for several days' test cell operations.

To gain the required capacity of 1200 gpm, the well was drilled to a depth of 1565 ft. Pumping equipment was installed 800 ft below grade. Because of the length of the shafting that would have been required with a standard vertical turbine, submersible pumping equipment was selected for the job. A 10-stage Byron Jackson pump, driven by a 350 hp, 2300 v motor was installed. The pump produces 1650 gpm from a pumping level of 509 ft and has, at the rated conditions of head capacity, an efficiency of approximately 68 per cent.

Standard 20-in. steel casing was used in the well, grouted in with 5-in. of concrete.

The water, as delivered from the well through 10-in. pipe, is discharged into an artificial reservoir 400 ft by 550 ft by 8 ft deep. When full, the reservoir has a capacity of 12,500,000 gal. Float controls are used to provide completely automatic pumping operation.

Water is taken from the reservoir by a vertical turbine pump and discharged through a 24-in. main to water towers which serve as the secondary reservoirs for the jet engine cooling water system. **End**

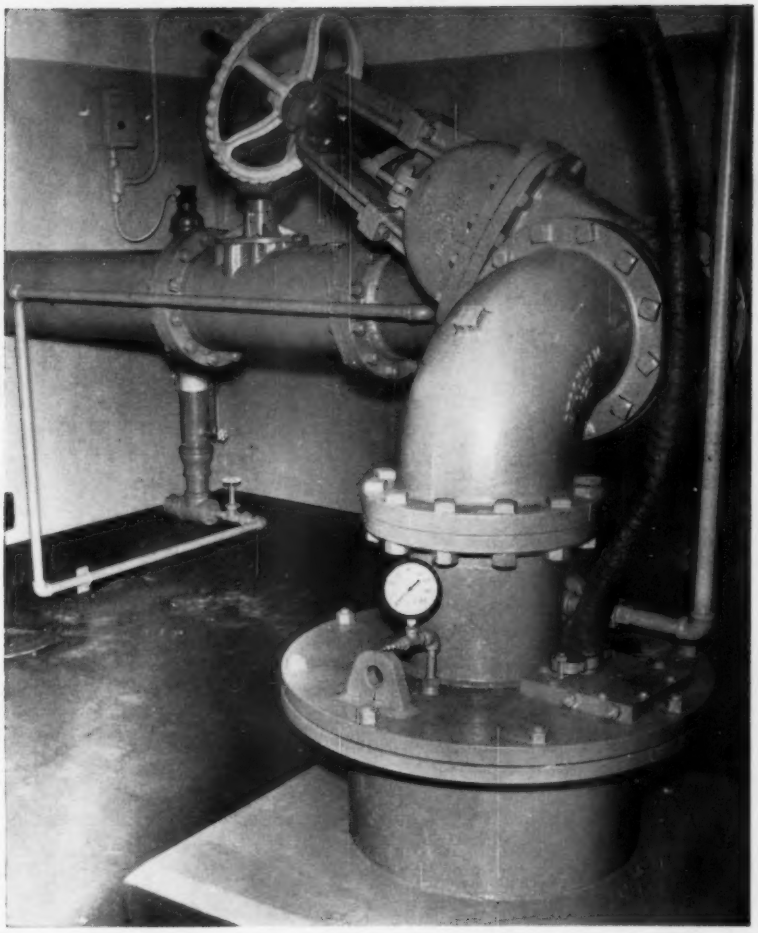


Fig. 2. Outlet and control valve are the only parts of pump above ground

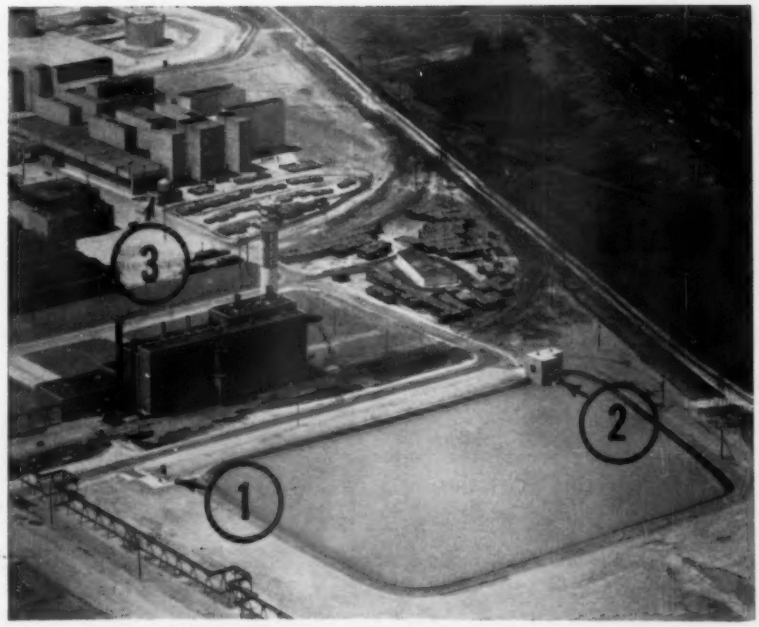
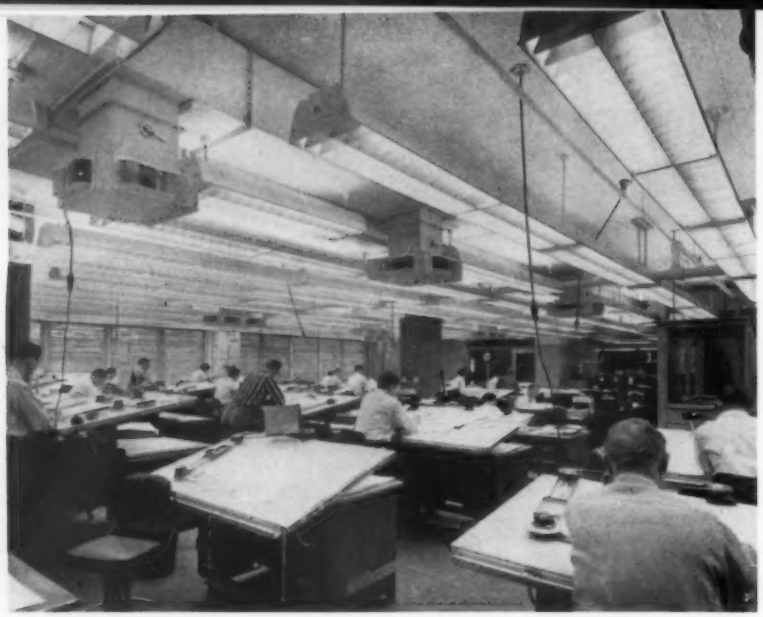


Fig. 3. Photograph shows location in the plant of 1. deep well pumphouse; 2. well water distribution house and intake; and 3. storage tank and pumphouse



Lighting system in this air conditioned room for tool design drafting delivers 130 ft-c of illumination on the boards. Curtis Coronet suspended fixtures, each with 2 F96 in. T12/CW lamps, spaced on 3 ft centers, mounted 8 ft comprise the system. Price of this lighting installed: $2.50 a sq ft per 100 ft

Drafting Room Lighting

Examples of Various Systems Will Help You Plan Your Lighting

By J. L. TUGMAN, Large Lamp Department, General Electric Co.

INDUSTRIAL DRAFTING rooms deserve careful consideration in their lighting design.

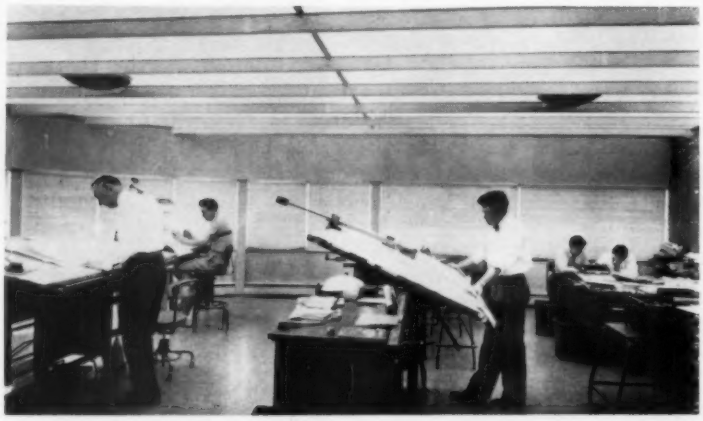
The illustrations on these pages offer examples of outstanding, contemporary drafting room practice. The captions explain the distinctions of these various solutions. Plant engineers will note how differences in techniques among these examples demonstrate a range of alternatives available in choosing between systems.

Let us consider the arguments for better lighting, and see how they apply to drafting room design. There are, of course, some elementary facts that must be kept in mind if we are to proceed soundly.

It always takes some effort to see. Most office tasks (and this includes industrial drafting) are "within arm's reach" which means our eyes must converge and focus on objects only 12 to 18 in. away. Most of us see and see well at distances exceeding 10 to 15 ft. However, the muscular stress of close work leads us to look away from our work frequently.

Our objective, therefore, is to reduce the amount of effort required to see. We should try to do this so that seeing is equally comfortable when the eyes are concentrated on the work and when they shift, as they must, to the general surround. Our purpose is to conserve energy throughout the day's work. We can do this by properly designing the illumination.

Well-planned lighting can mini-



Comfort feature of this luminous ceiling is provided by baffles which contribute to sound as well as light conditioning of room. Another feature of the baffles is that they shield portions of the luminous panels from the field of view. System delivers 60 ft-c. There are 95 F40T12/CW lamps, and 4 F20T12/CW lamps spaced on 2 ft centers above the plastic panels. Luminous ceiling height is 15 ft. Price of this lighting, installed: $3.00 to $3.50 a sq ft per 100 ft

This installation provides an average of 65 ft-c, employs 35 Daybrite two-lamp Luvex suspended 38 in. fixtures. Fluorescent lamps used in these fixtures are 96 in. T12/CW. The rows are spaced on 7 ft 6 in. centers. The room is 45 ft by 42 ft with 11 ft ceiling. Price of lighting $2.00 to $2.50 a sq ft per 100 ft

mize fatigue and increase productivity on virtually every task. There must be a reasonable quantity of light. It must be of such quality as to aid seeing, not interfere. That is to say it should be free from glare. The lighting system and the whole environment, therefore, should be visually comfortable. Shadows and reflections must be minimized. It is impracticable to eliminate them, but care should be taken to make sure they cause no serious interference with comfort or visibility.

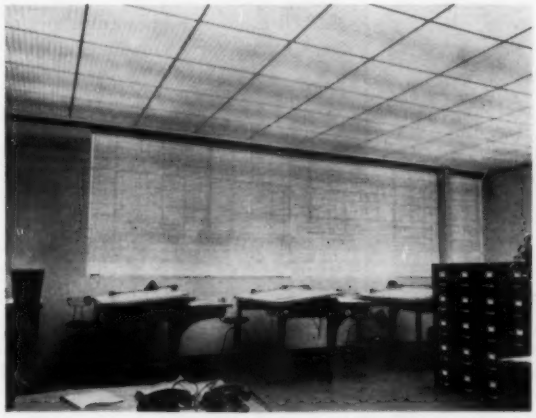
All these observations take on special significance when we plan the lighting for a drafting room. Think of the task: A large expanse of white paper on which the draftsmen must coordinate a meticulous array of details in fine lines. The expanse of paper is a large reflector, many times the size of a page of this magazine or an office letterhead.

In most drafting rooms the board is positioned horizontally. Elsewhere it is nearly vertical. When planning the lighting take into account how the board is positioned so that the large paper reflector will be bright enough to make the fine lines clearly visible, but not so bright as to be uncomfortable.

Our eyes must have light and things to look at. Without light, nothing is visible, and unless associated with surfaces, light cannot be seen. When light and surfaces are linked together, "brightness" results. Since light and surfaces are everywhere present in all work environments, it is inadequate to consider lighting as something separate and apart from everything else in the environment.

Basic among the factors to consider for comfortable seeing are (1) size, (2) contrast and (3) brightness. Let us consider these factors briefly.

Size is of vital significance to the



Louverall ceiling has been applied with success to drafting room solutions. Panels of aluminum cells give an appearance of a luminous ceiling in addition to serving function of shielding fluorescent lamps above. This type of lighting compares favorably in cost with other built-in systems. Price of this lighting, installed: $3.50 to $4.00 a sq ft per 100 ft

Single-lamp aluminum troffers in this installation have 40-watt fluorescent lamps. Troffers are spaced on 3 ft 4 in. centers with additional units along wall. Work positions along wall receive average of 80 ft-c compared to 70 ft-c in center of room. Mounting height of system is 10 ft. Price of this lighting, installed: $3.50 to $4.00 a sq ft per 100 ft

draftsman concentrating on the fine lines he must draw and relate to other fine lines.

The size of an object's image on the retinas of our eyes is the important factor in the seeing process —not the actual size of the thing in space. We are seldom concerned about items so small as to be invisible but there are many instances in which we would do well to (1) increase the size of work details and (2) orient the work so that the visual size would be in full proportion to the actual size.

Relatively new type of drafting room installation is provided with Smith-Holman two-lamp fixtures, supplying 100 ft-c. Note construction feature of fixture that separately shields each of the 8 ft slimline 430MA T12WW lamps in the unit. There are 140 fixtures in this 60 by 140 ft room. Units are spaced on 7 ft centers; ceiling is 12 ft. Price, installed: $3.00 to $3.50 a sq ft per 100 ft

Position of Drafting Boards

For example, in reading, 10-point type viewed at a 45 degree angle is no larger in visual size than the smaller 7-point that is viewed straight-on. (Let us keep this in mind with reference to the positioning of the drafting board.)

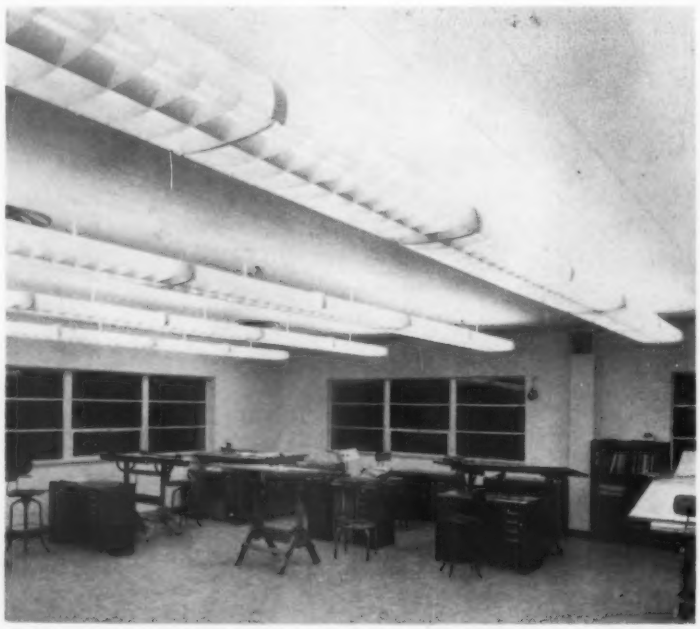
Contrast is a factor that is, perhaps, a bit easier to recognize.

To be visible a thing must have light on it and it must stand out from all the things around it. This means that the light from an object must somehow be different from the light coming from surrounding objects. The light may differ in amounts, in color or both. But there must be contrast in brightness or color if we are to see.

Combine the factors of size and contrast with that of brightness, in the right relationship, and comfort will be easier to achieve.

The brightness of an object is a measure of the light coming from a unit area. For most office and drafting room surfaces the brightness value (foot-lamberts) is equal to the illumination level (foot-candles) multiplied by the reflectance of the surface. With more light, the brightness of tasks is increased and seeing tends to be faster, easier and more accurate.

With these factors faithfully respected, lighting design can begin. For drafting rooms best practice today runs from 100 to 250 ft-c. Work tasks should be higher in contrast than the immediate surround.

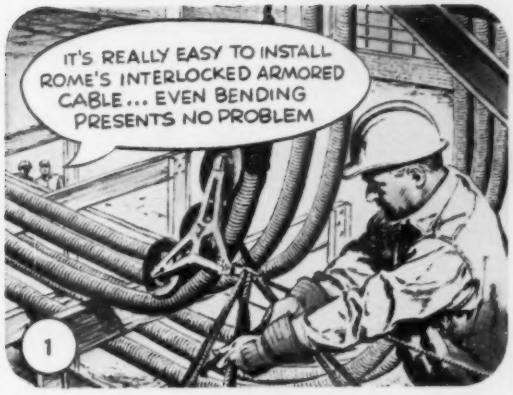


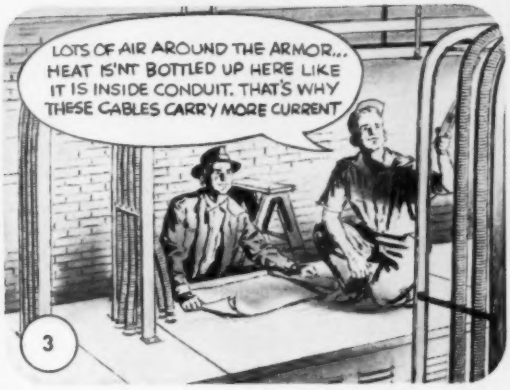
Lighting level of 230 ft-c is supplied by the relatively few fixtures in this room. Fixtures are equipped with four-lamp 96 in. T12 high output, cool white fluorescent units. These units are on 8-ft spacings and mounted 8 ft above the floor. Price of this type of lighting, installed: $3.50 to $4.00 a sq ft per 100 ft

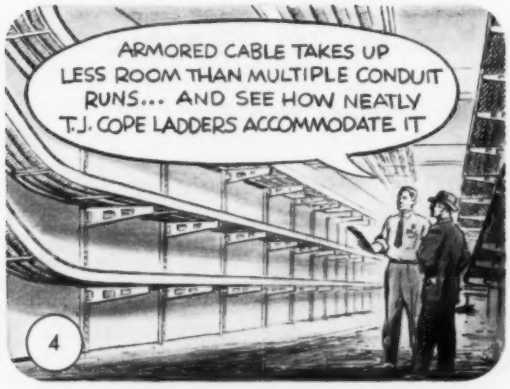
Shielding . . Color . . Shadows . .

By shielding the too-bright light sources, and, by eliminating too-dark materials in furniture and room surfaces, design comes nearer its objective of comfort. Color enlivens the environment if used tastefully. Shadows should be eliminated as far as possible, since they are the bane of drafting rooms. And there should be no reflected images of lamps or lighting equipment. Such images are distracting and, if they occur within the work itself, they can destroy its visibility. To eliminate, use matte or flat-finished surfaces and materials. **End**

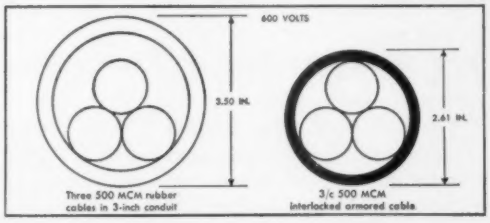
ROMAN ARMOR'S BEST...



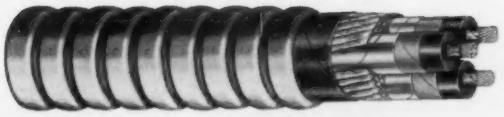

LOTS OF AIR AROUND THE ARMOR... HEAT IS'NT BOTTLED UP HERE LIKE IT IS INSIDE CONDUIT. THAT'S WHY THESE CABLES CARRY MORE CURRENT
3



A matter of FACT



Reduced space requirements Less space is needed for Rome Cable's interlocked armored cable —almost one inch less width for each three-conductor 500 MCM interlocked cable than for cable-in-conduit type installations.



For 600- to 15,000-volt service Rome's interlocked armored cable is available in three-conductor construction with Rozone A (butyl) insulation. It offers many more benefits than described here. For complete information, contact your nearest Rome Cable representative and ask for your free copy of Bulletin RCP-730. Or mail the coupon today.

ROME CABLE
CORPORATION

FREE BULLETIN describes all the benefits of Rome's Interlocked Armored Cable.

ROME CABLE CORPORATION
Department 731, Rome, New York

Please send me a copy of the new Rome Cable Bulletin RCP-730.

Name .....

Title .....

Company .....

Address .....

.....

Type of business .....

For more facts circle 565 on Reply Card

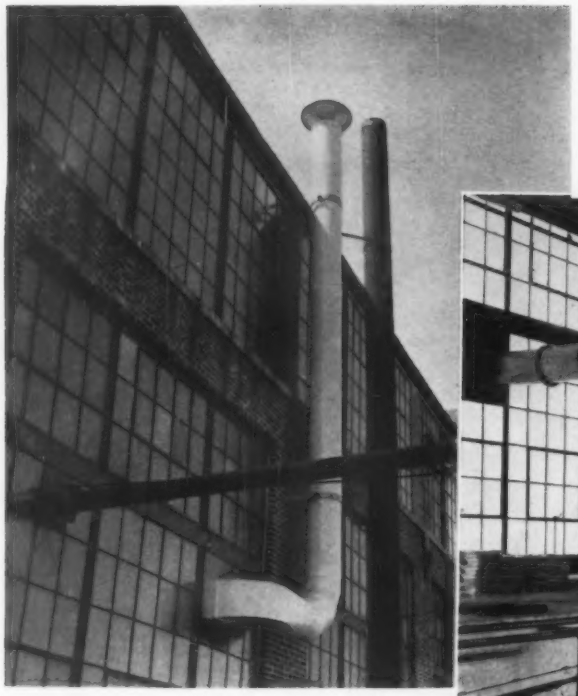


Fig. 1. Left, lightweight (white) stack made of fiber glass reinforced polyester resin needs no special foundation. Below, the pickling tanks. Hoods are power operated

Flexible Fume Removal System Is All Plastic

By R. A. BARROWS, Engineer, Western Electric Co., Hawthorne Works, Chicago, Ill.

AN ALL-PLASTIC housing has been erected over the pickling tanks used in the process for galvanizing wire, at the Clearings, Chicago, Illinois plant of Western Electric Co. It is part of the system for removing acid fumes generated in preparing wire for galvanizing.

The structure combines two hoods, each made entirely of fiber glass reinforced polyester resin. They are expected to have an indefinite life span and to require no maintenance. Ventilating ducts, fan housing, fan blades and outside stack are also made of the same material.

The old system of removing fumes was constructed of wood, steel and transite and was put into service in 1940. By 1955, it had deteriorated to a point where both the wooden structure and the exhaust system were beyond practical repair. From an operating standpoint, the work to be performed within the structure was both time consuming and unpleasant.

The new unit has power operated rolls and hoods, eliminating the need for operators to handle acid-contaminated rolls of wire. An interlocked hydraulic system permits the hoods and rolls to be raised and lowered to string wires or to elevate them above the tanks during shutdown periods. Lights, mounted over plastic windows in the ends of the hoods, permit operators to observe the tanks and wires through side windows. **End**

Fig. 2. After 15 years' service, the old structure was beyond economical repair

This planishing roll runs as hot as 300° F. Its durable HYPALON cover has processed millions of yards of vinyl floor covering.

HYPALON® Calender Roll Outlasts Rubber 15 to 1

Congoleum-Nairn reports HYPALON synthetic rubber gives 7 months' continuous service in processing hot flooring material. Rubber roll failed in 2 weeks.

Delaware Floor Products Division of Congoleum-Nairn, Inc., uses a HYPALON planishing roll on its calendering machine to help give vinyl flooring material a high gloss. The HYPALON roll presses hot plastic sheeting against a polishing roll. Surface temperatures run as high as 300° F. The machine operates 24 hours a day, 5 days a week.

Due to the extreme heat, abrasion, and attack of plasticizers and compounding ingredients, the rubber planishing rolls used previously lasted only two weeks before surface regrinding became necessary. The new HYPALON covered roll was installed in November, 1956. Since then it has been reground three times . . . twice because of accidental damage. The third time—under normal operating conditions – the HYPALON roll gave *7 months'* continuous service . . . *15 times that of ordinary rubber.*

This marked increase in service life is another example of HYPALON'S durability in the face of continued heat and abrasion. HYPALON synthetic rubber has the added advantage of complete resistance to ozone. It has excellent tensile strength and retains its flexibility in temperatures as low as –40° F. It does not support combustion, and can be compounded in white or a complete range of colors that remain stable under exposure to sunlight and weather.

The next time you replace or buy a rubber product, consider HYPALON. See how it will reduce your maintenance and operating costs. The technical representative from your rubber goods supplier can show you the benefits of HYPALON—also of neoprene, the synthetic rubber made by Du Pont for 25 years. For more information, just clip the coupon . . . now, while you're thinking about it.

HYPALON® *is a registered trademark of E. I. du Pont de Nemours & Co. (Inc.)*

ELASTOMERS IN ACTION HYPALON® • NEOPRENE

DU PONT
REG. U. S. PAT. OFF.

Better Things for Better Living
. . . through Chemistry

☐ I am particularly interested in _____

☐ Send me a free copy of *The Du Pont Elastomers* (a review of the properties of neoprene and HYPALON).

☐ Add my name to the free mailing list of the *Elastomers Notebook* (contains articles based on uses of Du Pont elastomers in industry).

E. I. du Pont de Nemours & Co. (Inc.)
Elastomer Chemicals Dept. PL-4
Wilmington 98, Delaware

Name _____
Firm _____
Address _____
City _____ State _____

For more facts circle 566 on Reply Card

One demonstration at the American-LaFrance fire school in Elmira, N. Y. What was once a roaring fire, in a simulated paint storage room, is quickly extinguished through use of Airfoam

Each student at the school is given an opportunity to handle many different water and Airfoam nozzles. Each fire school is set up on a three-day basis to permit complete familiarization of students with various types of equipment

Students here observe one of the instructors demonstrating a new technique of fire fighting with carbon dioxide. In addition to operation of equipment each student is taught proper methods of recharging, maintenance

How To Be a Fire Eater Without Getting Burned

"THERE IS NO substitute for experience!"—and experience is provided in super-abundance at the American LaFrance Industrial Fire School, held annually from April through October at the company's Experimental Station and Proving Grounds in Elmira, New York. Fire protection, fire fighting, or fire prevention—each of these problems is considered singularly and collectively.

Each fire school is set up on a three day basis—held Tuesday, Wednesday, and Thursday of a scheduled week. On the first day, students are given a carefully guided tour of LaFrance plant facilities.

Following this first exposure to equipment, company personnel demonstrate on actual fires, different kinds and types of portable extinguishers including: pressurized clear water, carbon dioxide, and the complete line of pressurized dry chemicals.

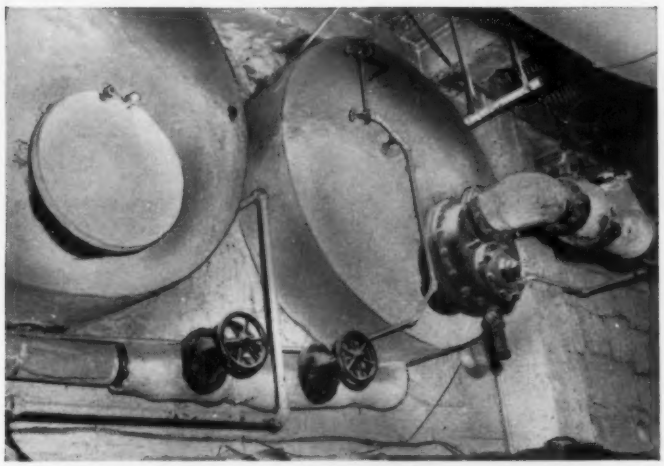
During the second day, students are permitted to handle portable equipment and extinguish different kinds and sizes of fires similar to demonstrations by instructors the day previously. Every student uses several types of nozzles.

Each student is taught the proper recharging and maintenance of hand portable, wheeled, and stationary dry chemical extinguishers. Trainees are encouraged to recharge their own equipment to insure thorough understanding of proper procedures. Inspection techniques are also learned: checking fullness in dry chemical tank; assuring proper operation of activating mechanism.

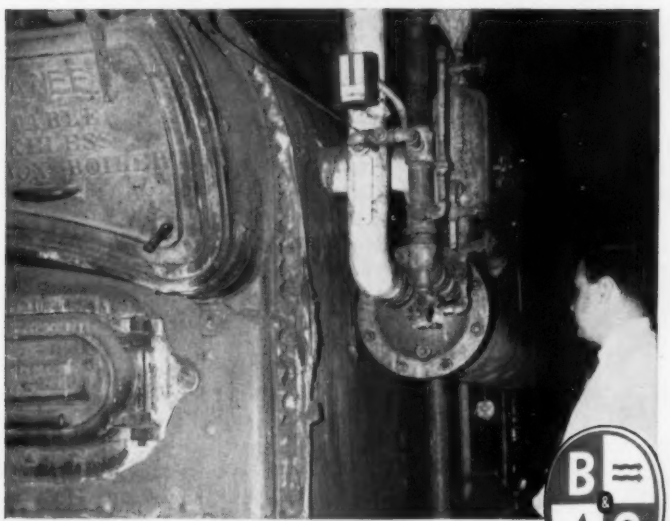
On the third day of training, students discuss Airfoam liquids and equipment and observe actual demonstrations of equipment. He also participates in fighting fires peculiar to his own industry. **End**

Readers of Plant Engineering who are interested in sending some of their personnel to this fire school should contact American LaFrance Corp., Fire School, Elmira, N. Y.—Editors

SAVES REPLACING EXPENSIVE HOT WATER STORAGE TANKS



THE PROBLEM: *How to economically replace two leaking hot water tanks.*



THE SOLUTION: *Old tanks were capped off and a compact B&G Type "WU" Instantaneous Water Heater connected to the boiler.*

The photos here tell a significant story to plant superintendents and operating engineers. The "Problem" picture shows two old-fashioned hot water storage tanks, requiring replacement because of leakage... the "Solution" picture how the tanks were replaced with a modern B&G Instantaneous "WU" Heater.

To remove and replace the two leaking hot water tanks would have been a difficult and costly job. Installing a comparatively tiny B&G Type "WU" Heater *saved hundreds of dollars* and in addition *increased the available volume of hot water!* In 12 years of operation there has never been a shortage of hot water.

Why the B&G "WU" Heater saves space and money

The "WU" comes equipped with a B&G Booster Pump which pumps boiler water through the shell, greatly increasing the capacity of the heater. Large volumes of hot water are produced by amazingly small units.

The Booster is controlled to start whenever water temperature goes below the desired degree. Boiler water is pumped through the shell of the "WU" until service water is again at the correct temperature.

The "WU" Heater can be installed on hot water boilers or below the water line of steam boilers.

Send for this booklet on the application, selection and installation of B&G Instantaneous Water Heaters.

BELL & GOSSETT
COMPANY
Dept. FF53, Morton Grove, Illinois
Canadian License: S. A. Armstrong, Ltd., 1400 O'Connor Drive, Toronto 16, Ontario

*Reg. U.S. Pat. Off.

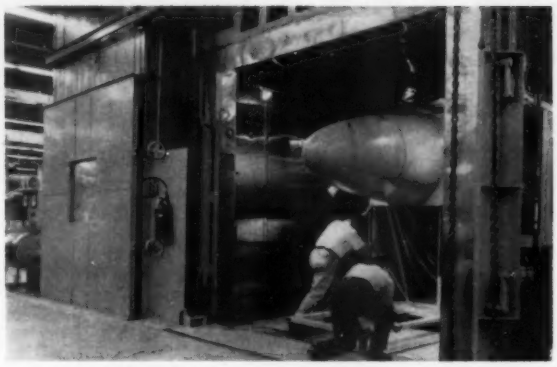
For more facts circle 567 on Reply Card

Test Chambers Duplicate Nature's Worst Weather To Test Aircraft Parts

To MAKE SURE that automatic armament systems for Navy and Air Force planes will work anywhere, regardless of environment, Westinghouse engineers and technicians are duplicating blazing temperatures and numbing cold. Equipment that facilitates this "weather-making" is an environmental test chamber installed at the company's Friendship Airport plant in Baltimore.

Such equipment as radar and computers that make up the all-weather fire control systems are placed in the weather chambers that simulate altitude of 90,000 ft, and are capable of temperatures ranging from minus 105 F to 500 F and humidity approaching 100 per cent —even with salt spray.

The $400,000 installation, in two separate sections, measures 10 ft in height, 18 ft in width and 16 ft in depth. Each section is heavily insulated, and lined with stainless steel. The altitude-temperature chamber conducts rapid temperature changes by heating or cooling



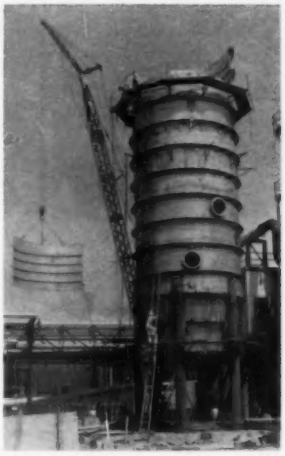
air in a separately-enclosed area above the test area. When rapid change is desired, trap doors in ceiling are opened and fans circulate hot or cold air into main area.

Butterflies Are Built Big

BUTTERFLY valves that put their namesakes to shame are two being built for the Aliquippa, Pennsylvania works of the Jones & Laughlin Steel Corporation.

Fabricated by Blaw-Know, the eight-foot, six-inch I.D. valves are for use in a basic oxygen furnace process. Forming a part of the electrostatic precipitator circuit of the dust collection and gas cleaning system, the valves will handle 235,000 cfm of gas at 500 F.

Fertilizer Crystallizer—All Stainless



DESIGNED to produce approximately 300 tons of ammonium sulfate a day, a stainless steel crystallizer is being put into production at Hopewell, Va., by the National Aniline Div., Allied Chemical & Dye Corp.

Fabricated by Struthers Wells Corp., from type 316 stainless supplied by Allegheny Ludlum Steel Corp., the crystallizer weighs more than 150 tons, is 82 ft in height and 20 ft in diameter.

Frontier Setting Provides "Change of Scene" for Industrial Workers' Lunch Hour

STRAIGHT OUT OF THE WEST, a store-front "set" has been installed in a Kansas City, Mo., industrial plant, less than 25 ft from the main production line. At the Vendo Co., the set houses vending machines, which serve the company's employees complete meals, from soup to nuts, in addition to beverages, candy and cigarettes.

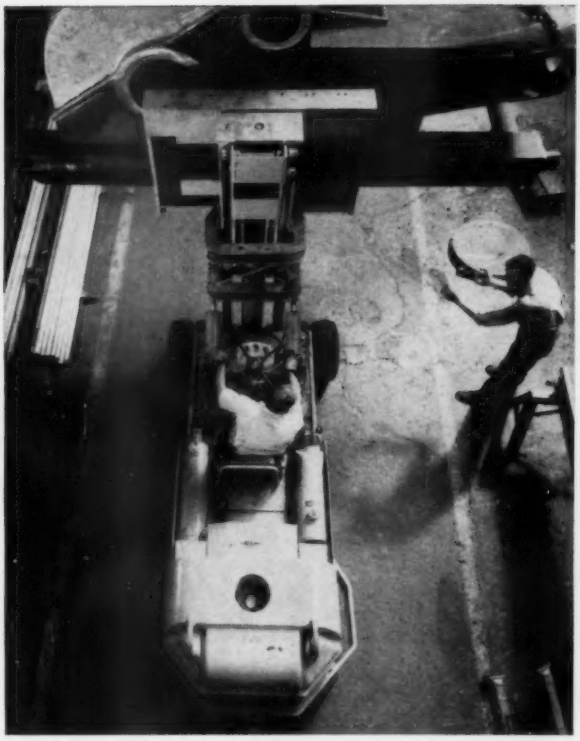
The Western backdrop, approximately 60 ft long and 16 ft high, is painted to resemble buildings in an old frontier town. A hitching post running along the canopied Western sidewalk in front of the machines serves as a shelf on which employees may slide their trays while they are making food selections from the vending machines.

The Cow Palace saloon painted on the setting houses milk vending equipment; Kit Carson's Kitchen is the backdrop for machines that vend hot foods; under the Cold Bottle can be found soft drink machines.

Called the Hitch 'n Skillet, the western scene is one of several that Vendo plans to offer to industry and commercial institutions, to brighten up their vending machine batteries. Other designs include a river steamboat, a sidewalk restaurant, a carousel and hunting and fishing backdrops.

B.F.Goodrich

Pneumatic? B.F.Goodrich makes a complete range of sizes and variety of tread designs, including the new All-Purpose.



or Solid? Which is right for you? Pressed-On Solid in regular or Deluxe Cushion, or Vulcanized-On Solid? What tread design? What compound?

Your B.F.Goodrich TW TIRE AND WHEEL Analysis man gives you industrial tire advice . . . FREE!

Problem: There are many variables in industrial tire types, sizes, tread compounds and tread designs. Do you know which tire is right for your materials handling job?

Solution: Without cost or obligation your B.F.Goodrich Tire and Wheel Analysis man will study your equipment, loads, hauling surfaces and other special problems you have. He'll recommend the right tires for you to use—recommendations that are unbiased because B.F.Goodrich makes a *complete* line of industrial tires.

Result: You save as much as 50% on industrial tire costs, as much as 20% on maintenance costs! Mail the coupon today for your FREE B.F.Goodrich TW Analysis.

A special consulting service is available to manufacturers of materials handling equipment.

Specify B.F.Goodrich tires when ordering new equipment

B. F. Goodrich Tire Company
A Division of The B. F. Goodrich Company
Department TW-689, Akron 18, Ohio

I would like further information on your FREE TW Analysis.

NAME _____

COMPANY _____

STREET _____

CITY _____ STATE _____ ZONE _____

B.F.Goodrich industrial tires

For more facts circle 568 on Reply Card

NEW PLANT CONSTRUCTION —advance information on location, costs

Sheffield, Ala.—Reynolds Metals Co., 2591 S. Third St., Louisville, Ky., plans to add a hot strip mill for the production of aluminum plates and strip. Work on the new unit is already under way and is scheduled for completion by mid-1959. United Engineering & Foundry has been awarded the construction contract out of the Pittsburgh office. Installation will represent an investment of about $2 million.

Foremen, Ark.—Arkansas Cement Corp., Shreveport, La., has broken ground for a $12-million cement plant. The plant scheduled for completion by early 1959 or possibly late 1958, will be designed to produce 1.4 million bbl of cement per year. Designers and builders are Kaiser Engineers of Oakland, Calif.

Rillito, Ariz.—Arizona Portland Cement Co., this city, plans to construct a new cement plant at Ash Fork, Ariz., rather than enlarge local operations here. New plant reported to cost in excess of $12 million, with a 2-million bbl capacity is expected to be placed in operation in the spring of 1959. Plans for the two-kiln installation are by Donald R. Warren Engineering Co., Los Angeles, Calif.

Danbury, Conn. — Reeves Soundcraft Corp., 10 E. 52nd St., New York, N. Y., is constructing a new plant for the manufacture of magnetic tape. Structure will be of steel and concrete construction with a floor area of better than 50,000 sq ft. Leo McManus Construction Co., Inc., has been awarded the construction contract reported to be about $1 million.

Harrington, Del.—Trane Co., 206 Cameron Ave., La Crosse, Wis., has acquired a building site here for the construction of a new plant for the manufacture of company products. Plant will be a one-story steel and concrete structure of approximately 30,000 sq ft. Plant will be completed in the spring of 1959 at a cost of about $300,000.

Watkinsville, Ga.—Anaconda Wire & Cable Co., 25 Broadway, New York, N. Y., plans to construct a new plant for the manufacture of various types of steel and wire cable. Plant will be erected on a 175-acre site recently acquired for the purpose. Plant, of concrete and glass construction, will include manufacturing facilities as well as space for warehousing of merchandise. New facility is scheduled for completion by late this year or early 1959, at a cost of $1 million.

Chicago, Ill. — National Container Corp., a subsidiary of the Owens-Illinois Glass Co., 7 Central Park West, New York, N. Y., will build a new plant in the Calumet port area near here to supply corrugated shipping containers to customers in the Chicago area. New facility will have a floor area of 230,000 sq ft. Plant is expected to be completed by the first quarter of 1959.

Chicago, Ill.—Witco Chemical Co., 122 E. 42nd St., New York 17, N. Y., plans to construct a new plant for the production of phthalic anhydride. Plant will be designed and constructed by the Scientific Design Co., Inc., this city, for an annual capacity of 20 million lb of phthalic anhydride. Plant will be located in Chicago's Clearing district adjacent to one of company's present chemical manufacturing plants. Work will get under way at once for early completion in 1959.

Herrin, Ill.—Olin Mathieson Chemical Corp., Mathieson Building, Baltimore 3, Md., has acquired a 500-acre site near here on which it plans to construct facilities for the testing of solid rocket-propellant fuels the company developed.

Northbrook, Ill.—Underwriters Laboratories Inc., 207 E. Ohio St., Chicago, Ill., plans a large addition to its testing facilities here. New installation will house a furnace for testing floor and ceiling material. A furnace will also be erected in the new building for conducting burning brand and wind tests on roofing materials. Cost of the new facility, with equipment, reported to be in excess of $1.5 million.

Louisville, Ky.—Reynolds Metals Co., Reynolds Metals Bldg., Richmond 18, Va., plans an expansion and improvement program for its aluminum foil rolling operation in the Louisville plant. The expansion program will include the installation of 14 high-speed foil mills and companion equipment. Cost of expansion and improvement project will exceed $3 million.

Louisville, Ky. — Stauffer Chemical Co., 382 Madison Ave., New York 17, N. Y., plans to construct a large hydrofluoric acid plant. New plant will be located adjacent to company's present petrochemical plant. Work will begin soon for completion in 1959. New project will be designed and engineered by company's engineering department and is reported to be a multi-million dollar installation.

Norco, La.—Shell Chemical Corp., 380 Madison Ave., New York 17, N. Y., plans construction of two multi-million dollar plants at local site here. One plant will be devoted to the production of acrolein and the other to the conversion of acrolein to glycerin. Both plants will use new processes developed by company scientists, who have done extensive research in acrolein chemistry.

St. Louis, Mo. — Chrysler Corp., 344 Massachusetts Ave., Detroit, Mich., plans to construct a one-story assembly plant on highway 66, within the city limits. Plant will be of reinforced concrete and steel frame construction and will have a floor area of 1,300,000 sq ft. Preliminary construction work is already under way and plant is scheduled for completion early in 1959. Cost reported to be about $15 million. Work will be handled by Associated Architects & Engineers, Inc., 345 New Center Building, Detroit, Mich.

Vicksburg, Miss. — Mississippi Valley Portland Cement Co., is constructing a new cement plant near Redwood, Miss. Plant when completed next spring will have an annual capacity of 680,000 bbl of cement. Plant will represent an investment of approximately $3.7 million.

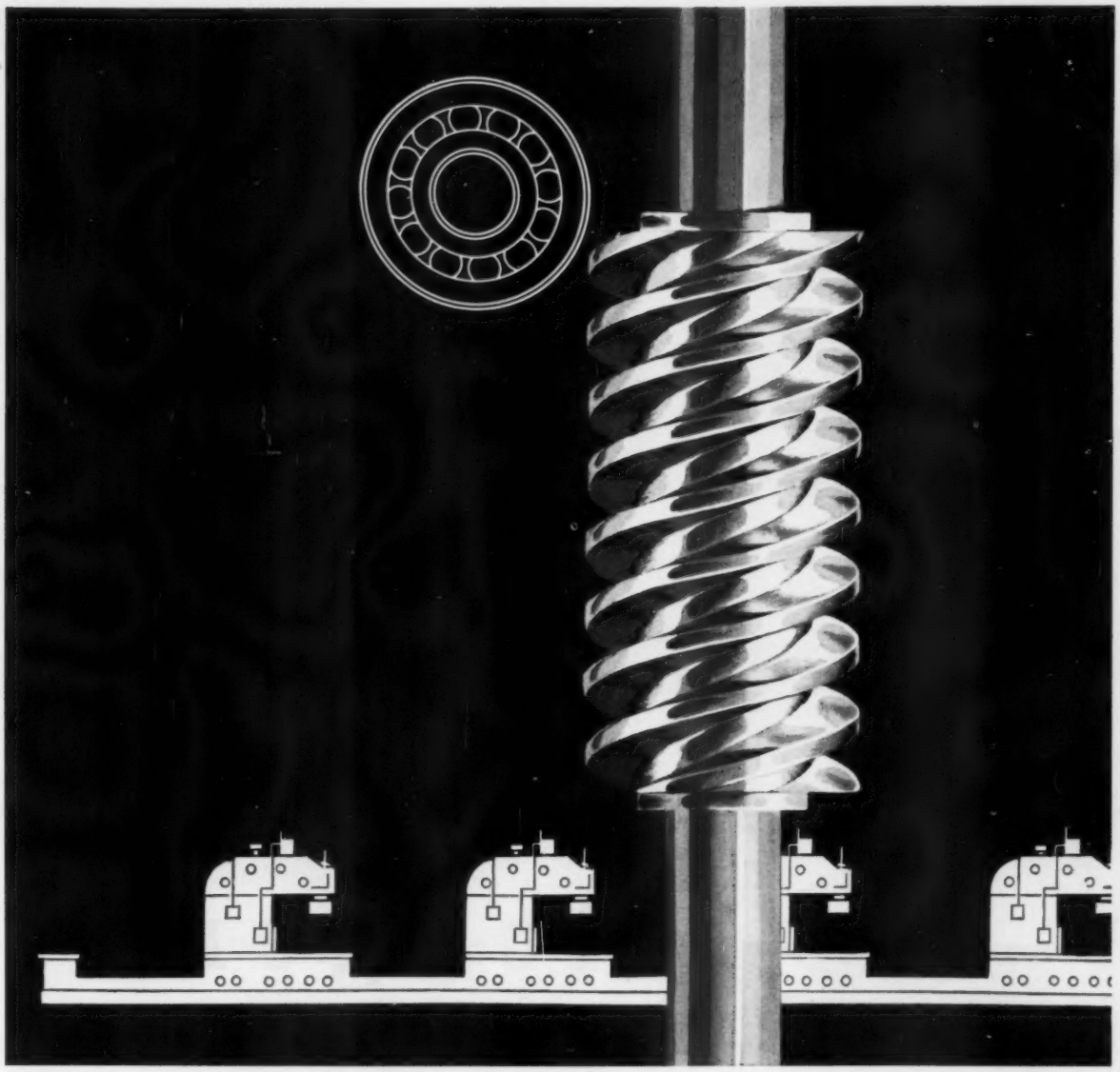
Gibbstown, N. J.—E. I. du Pont de Nemours, Explosives Department, Nemours Building, Wilmington, Del., plans to construct three new production units for the manufacture of hydrogen, anhydrous ammonia, aniline and diphenylamine, at company's Repauno Works, near here. The new facilities for aniline and diphenylamine will replace obsolete equipment. New facilities for the production of hydrogen and anhydrous ammonia will be the first at local headquarters here. Construction is scheduled to begin at once for completion in about two years.

Winston-Salem, N. C.—P. H. Hanes Knitting Mills Co. has plans under way for the construction of a new knit cloth manufacturing plant. One-story structure of steel and concrete will have a total floor area of 105,000 sq ft and is reported to cost in excess of $1 million, exclusive of equipment. Plant is expected to be in operation by early 1959.

Middletown, O.—Sorg Paper Co. has approved plans for a major expansion and improvement program of company's paper-making facilities. Included in the program are the installation of new stock preparation equipment, the rebuilding of the paper machine at the Oglesby mill and the construction of a warehouse facility at the South mill. When alterations are completed sometime in 1959 total cost will approximate about $2 million.

Youngstown, O.—Ohio-American Paper Products Co., East Liverpool, O., has awarded a contract to the D. D. Davis Construction Co., for the con-

(Continued on page 208)



extra protection under "extreme" conditions

Esso Pen-O-Led EP lubricants offer an added margin of protection for rugged-duty gears and bearings. Even under the most severe shock and extreme-pressure loads, Pen-O-Led positively prevents the welding of mating gear teeth or bearing surfaces and it checks severe sliding friction of worm gears.

The extraordinary load-carrying capacity of Pen-O-Led is made possible by a lead soap additive which is highly compatible with the base oil. Result: excellent resistance to oxidation and chemical deterioration . . . Pen-O-Led resists thickening in use and has unusual stability against separation in service or storage. It is non-corrosive to steel and bronze and other copper alloys.

The versatility of Pen-O-Led helps keep costs low – by reducing handling and inventory, eliminating errors. *One* Pen-O-Led lubricant can do the job of two different gear and bearing lubricants. Pen-O-Led lubricants are available in *eight* viscosity grades. For technical information, contact the nearest Esso Standard Oil Company Division Office: Boston; Pelham, N. Y.; Elizabeth, N. J.; Bala-Cynwyd, Pa.; Baltimore; Richmond; Charlotte; Columbia, S. C.; Memphis; New Orleans.

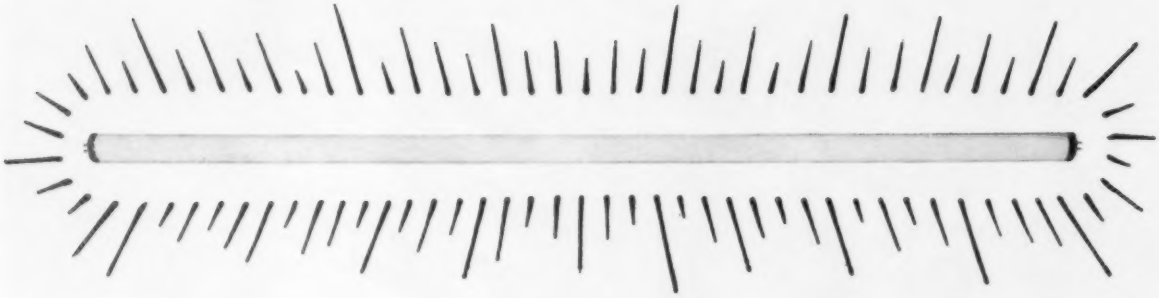
PERFECTED BY RESEARCH

PEN-O-LED® EP Esso

PROVED IN PERFORMANCE

For more facts circle 569 on Reply Card

Goodbye, "Dead-Ends"!



Westinghouse lamps stay bright from end to end...

l-o-n-g-e-r !

New Westinghouse chrome vanadium alloy leads reduce end blackening—keep lamps bright end to end longer.
WESTINGHOUSE
40W COOL WHITE
U S A

"ULTRALUME" phosphors coat the inside of all Westinghouse fluorescent lamps. Only Westinghouse has "Ultralume"...the phosphors that assure maximum brightness for the life of the lamp.

Banish light-robbing, unsightly "dead-ends" on your fluorescent lamps. Next time, use Westinghouse lamps with exclusive "Ultralume"™ phosphors and new chrome vanadium alloy leads. The combination of revolutionary new leads and Ultralume phosphors make Westinghouse lamps give maximum light longer and keep them bright end to end!

Save money, too! Lamp for lamp, Westinghouse fluorescents give more light for the same wattage. You get more light per foot . . . more light per dollar!

Specify Westinghouse on every lamp order. Call your local authorized Westinghouse agent or write—Westinghouse Lamp Division, Bloomfield, N. J.

YOU CAN BE SURE...IF IT'S

Westinghouse (W) FLUORESCENT LAMPS

For more facts circle 570 on Reply Card

Cumberland Plant, Pittsburgh Plate Glass Company
Designed by Lockwood-Greene, Engineers, New York, N. Y.

Where next?

Completion of 10,199-ton job means only the beginning of another to veteran American Bridge superintendent!

THIS man represents one of the vital advantages you get when American Bridge erects your buildings.

He is "Liz" Evelsizer, American Bridge erecting superintendent. Veteran of 25 years of erecting steel, and superintendent of many major projects, he has just finished erecting Pittsburgh Plate Glass Company's tremendous new plant near Cumberland, Maryland—10,199 tons of structural steel without a major hitch. (Not to mention the installation of thousands of tons of plant machinery and overhead cranes.)

"Liz" Evelsizer is a typical American Bridge erecting superintendent. With such great projects as Buick's Flint Plant (1952), Continental Can's Pittsburgh Plant (1953), and General Electric's Louisville Works (1955) behind him, and with as fine an erecting crew as you'll find anywhere working for him, it's obvious why the apparently ticklish task of putting up structures soundly, speedily and safely has long since been a habit with him.

And, as we said, "Liz" Evelsizer is a typical American Bridge erecting superintendent. They all have broad experience in the most demanding kinds of structural steel work, justifying their casual confidence that there isn't a structure that they can't handle in stride.

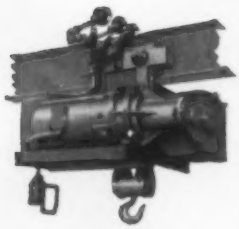
So it is the combination of experienced men like "Liz" Evelsizer working with steel, the finest construction material available—steel that has been precision fabricated by equally experienced men—that assures you of a first-rate job from American Bridge every time.

USS is a registered trademark

American Bridge
Division of USS United States Steel

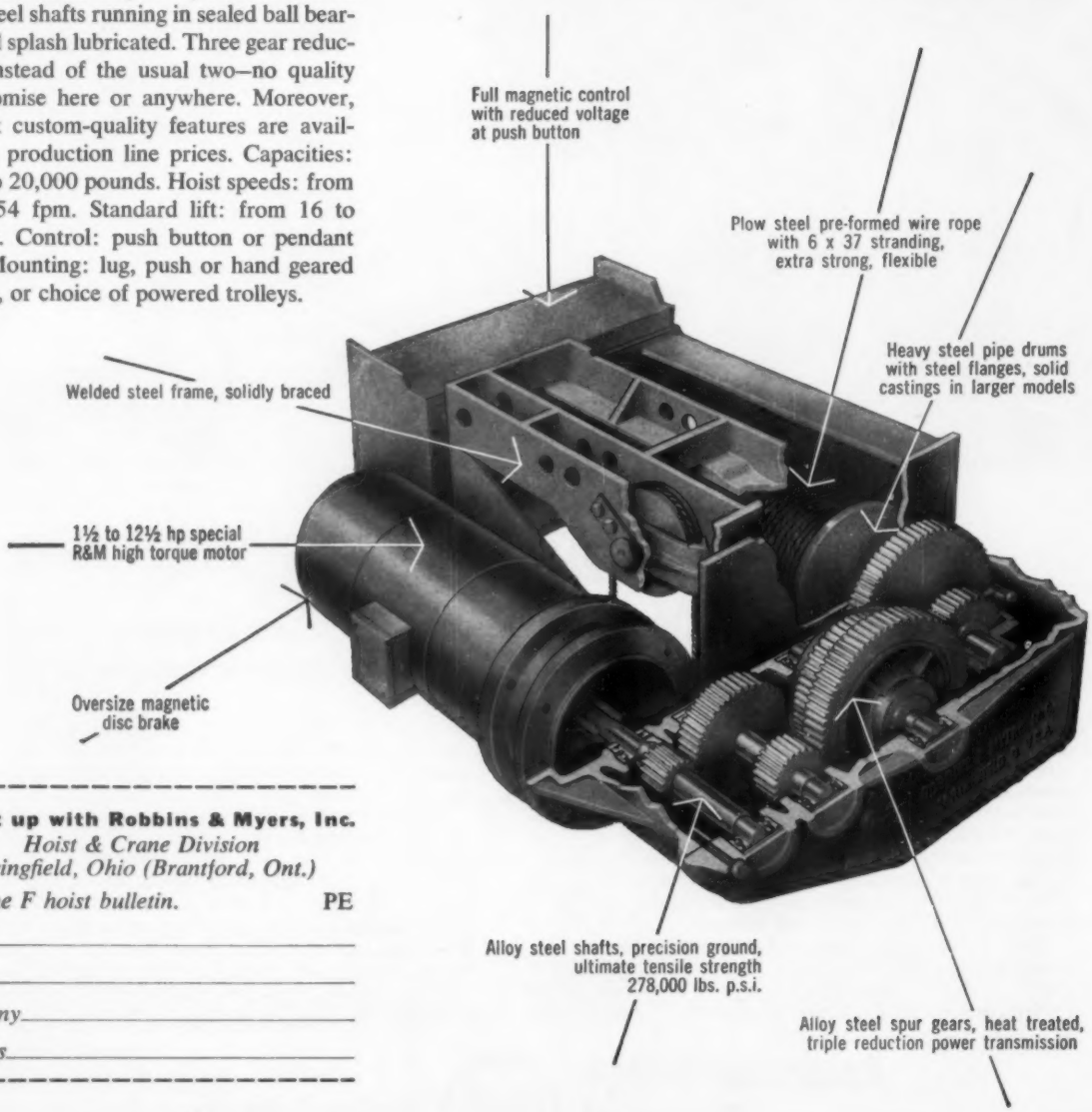
General Offices: 525 William Penn Place, Pittsburgh, Pa.
Contracting Offices in: Ambridge · Atlanta · Baltimore · Birmingham · Boston · Chicago · Cincinnati · Cleveland · Dallas · Denver · Detroit · Elmira Gary · Houston · Los Angeles · Memphis · Minneapolis · New York · Orange, Texas · Philadelphia · Pittsburgh · Portland, Ore. · Roanoke St. Louis · San Francisco · Trenton · United States Steel Export Company, New York

For more facts circle 571 on Reply Card



choose a hoist with extra stamina

R&M F hoists cut down the cost of lifting but the F hoists save still more money. Dollars usually spent on maintenance become dollars earned because of the extra stamina built into each component. Look at the gearing—here are precision cut alloy steel spur gears, wide faced and heat treated for durability. They're mounted on alloy steel shafts running in sealed ball bearings, all splash lubricated. Three gear reductions instead of the usual two—no quality compromise here or anywhere. Moreover, F hoist custom-quality features are available at production line prices. Capacities: 1000 to 20,000 pounds. Hoist speeds: from 10 to 54 fpm. Standard lift: from 16 to 40 feet. Control: push button or pendant rope. Mounting: lug, push or hand geared trolleys, or choice of powered trolleys.


Full magnetic control with reduced voltage at push button
Plow steel pre-formed wire rope with 6 x 37 stranding, extra strong, flexible
Heavy steel pipe drums with steel flanges, solid castings in larger models
Welded steel frame, solidly braced
1½ to 12½ hp special R&M high torque motor
Oversize magnetic disc brake
Alloy steel shafts, precision ground, ultimate tensile strength 278,000 lbs. p.s.i.
Alloy steel spur gears, heat treated, triple reduction power transmission

take it up with Robbins & Myers, Inc.
Hoist & Crane Division
Springfield, Ohio (Brantford, Ont.)

Send me F hoist bulletin. PE

*Name*_____

*Title*_____

*Company*_____

*Address*_____

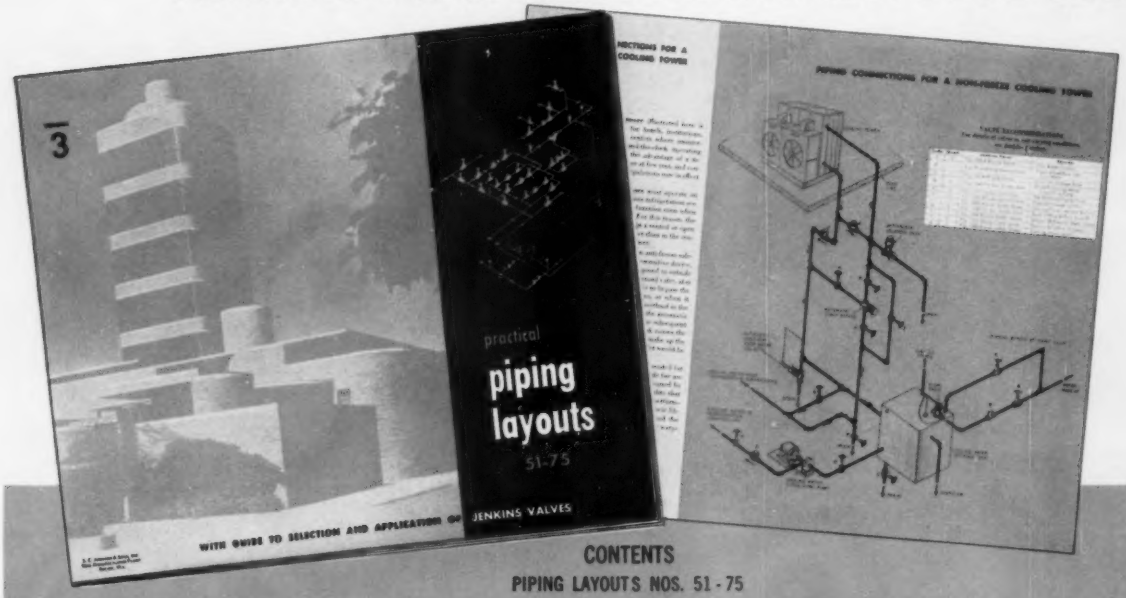
ROBBINS & MYERS **hoists • cranes • winches**

For more facts circle 572 on Reply Card

AVAILABLE NOW! no. 3

in the famous series of

JENKINS PRACTICAL PIPING LAYOUTS *Books*



CONTENTS

PIPING LAYOUTS NOS. 51 - 75

No.	PIPING LAYOUT
51	Storage and Vaporizer Hookup for Liquefied Petroleum Gas.
52	Package Boiler Connections
53	District Steam Building Connections
54	Steam Desuperheater Piping Connections
55	Dry Cleaning Solvent Distillation Piping Connections
56	Automatic Combustion Controls
57	Connections for Typical Meters
58	Piping Connections for Steam Turbine Driven Centrifugal Refrigeration Compressor
59	Absorption Refrigeration Piping for Air Conditioning System
60	Single Coil All-Year Air Conditioning System
61	Cooling Water System for Refrigeration Compressors
62	Zeolite (Base Exchange) Water Softening System
63	Piping Connections for a Diesel Engine Lubrication Oil Purification System
64	Piping for Plumbing and Heating in a Small Taxpayer Building
65	Piping Connections for an Industrial Plant Air Compressor
66	Piping Connections for an Air-Washer Air Conditioning System
67	Continuous Cold Lime-Soda Ash Water Softening System
68	High Pressure—High Temperature Hot Water Piping System
69	Steam Jet Refrigeration System
70	Industrial Waste Treatment System
71	Piping Connections for a Non-Freeze Cooling Tower
72	Sulfate Pulping Process System
73	Piping for Acid Liquor Preparation in the Sulfate Pulping Process
74	Sulfate Pulping Liquor Recovery System
75	Piping Connections for Space Heating with Refrigeration Condenser Hot Water Discharge

PLUS 10 PAGES OF VALVE SPECIFICATIONS

Volume 3 is a 36-page collection of 25 basic piping diagrams with complete recommendations for valve selection and location in the lines. The material has been prepared by registered consulting engineers in collaboration with the Jenkins Bros. engineering staff and leading equipment manufacturers. It supplements the two booklets released by Jenkins Bros. in past years as a service to consulting engineers, architects, contractors, specification writers and plant operation managers.

In addition to the piping diagrams, this book contains a ten-page, illustrated quick-reference specification "chart" which gives essential data on the complete line of Jenkins Valves.

JENKINS

LOOK FOR THE JENKINS DIAMOND

VALVES

JENKINS SINCE 1864 Jenkins Bros.

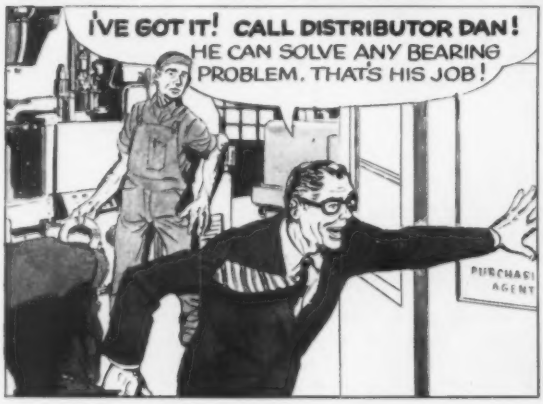
Sold Through Leading Distributors Everywhere

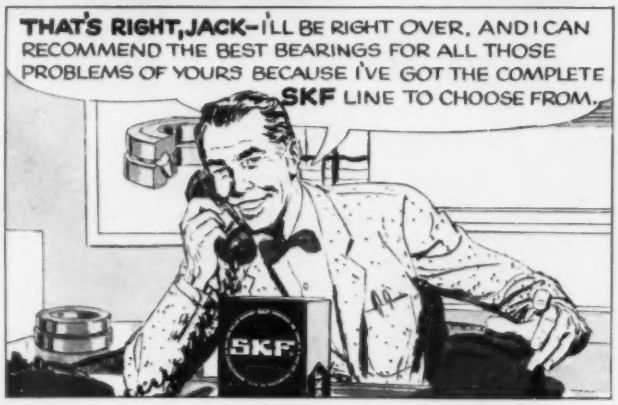
For your copy, *please request Volume 3, Jenkins Practical Piping Layouts on your letterhead.*
Write to JENKINS BROS., *Room 48, 100 Park Ave., New York 17.*

For more facts circle 573 on Reply Card

The real life adventures of DISTRIBUTOR DAN the SKF bearing man

I'VE GOT A BEARING PROBLEM! IS THERE AN ANTI-FRICTION BEARING THAT'LL TAKE HEAVY THRUST LOADS AT HIGH SPEEDS - ON A VERTICAL SHAFT?
PURCHASING AGENT




THAT'S RIGHT, JACK- I'LL BE RIGHT OVER, AND I CAN RECOMMEND THE BEST BEARINGS FOR ALL THOSE PROBLEMS OF YOURS BECAUSE I'VE GOT THE COMPLETE SKF LINE TO CHOOSE FROM.
SKF

ONLY SKF MAKES ALL 4 KINDS OF BALL AND ROLLER BEARINGS... AND WITH THAT KIND OF VARIETY I CAN KEEP AN OPEN MIND ON JACK'S PROBLEM, AND ON YOURS TOO!

WHEN YOU'VE GOT ANY KIND OF BEARING PROBLEM WE'LL FIX YOU UP IN A HURRY. CALL YOUR NEARBY AUTHORIZED SKF DISTRIBUTOR TODAY!
SKF
AUTHORIZED DISTRIBUTOR
7B30

Spherical, Cylindrical, Ball, and "Tyson" Tapered Roller Bearings

EVERY TYPE—EVERY USE

SKF

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.

*REG. U. S. PAT. OFF.

For more facts circle 574 on Reply Card

Garlock CHEMISEAL Mechanical Seal used on pumps at Continental Oil Co. has TEFLON bellows, a TEFLON-filled carbon sealing face, and ceramic stationary seat.

Sulphuric Acid Sealing Problem licked with less expensive, easy to install *Garlock Mechanical Seal*

In April 1955, Continental Oil Co., Chicago installed a standard Garlock CHEMISEAL* on a centrifugal pump handling 101.6% and 78-80% sulfuric acid for one-fourth the cost of the previous seal. This outside seal was reported easy to install by regular maintenance personnel. The service life is 8 to 10 months compared to 8 days for soft packing.

Now all centrifugal pumps in this service at Continental are equipped with Garlock CHEMISEAL Mechanical Seals. They handle up to 100,000 lbs. per day of sulfuric acid at temperatures to 135° F.

Garlock CHEMISEALS can solve your difficult sealing jobs too. Ask your Garlock representative for his recommendation. He can choose from "The Garlock 2,000" . . . two thousand different styles of packings, gaskets, and seals for every need. Or write for CHEMISEAL Folder AD-164.

*Registered Trademark

THE GARLOCK PACKING COMPANY, Palmyra, New York

For Prompt Service, contact one of our 30 sales offices and warehouses throughout the U. S. and Canada.

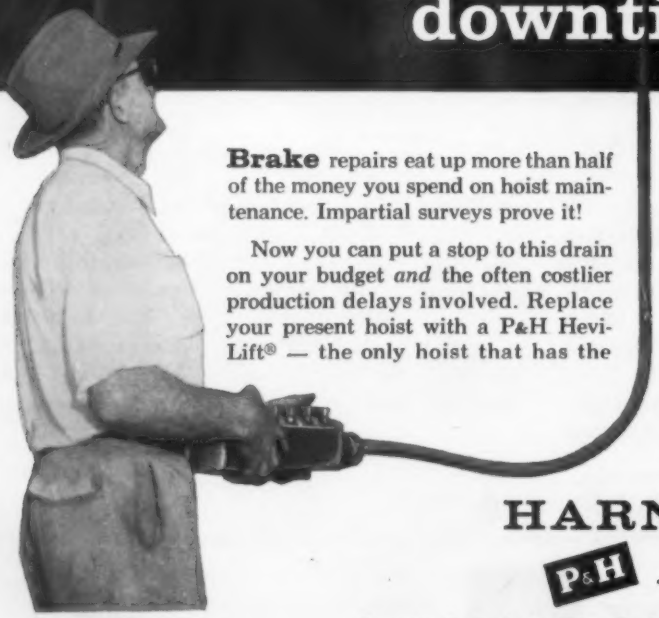
GARLOCK

Packings, Gaskets, Oil Seals, Mechanical Seals, Molded and Extruded Rubber, Plastic Products

For more facts circle 575 on Reply Card

another P&H exclusive...

maintenance-free RCD brake cuts hoist downtime 50%



Brake repairs eat up more than half of the money you spend on hoist maintenance. Impartial surveys prove it!

Now you can put a stop to this drain on your budget *and* the often costlier production delays involved. Replace your present hoist with a P&H Hevi-Lift® — the only hoist that has the mill-type, maintenance-free RCD brake.

The RCD has no clapper, no linkage, no laminations — total stroke is only 1/32 of an inch. Braking is fast, positive. There's no violent hammer-action to cause wear on parts.

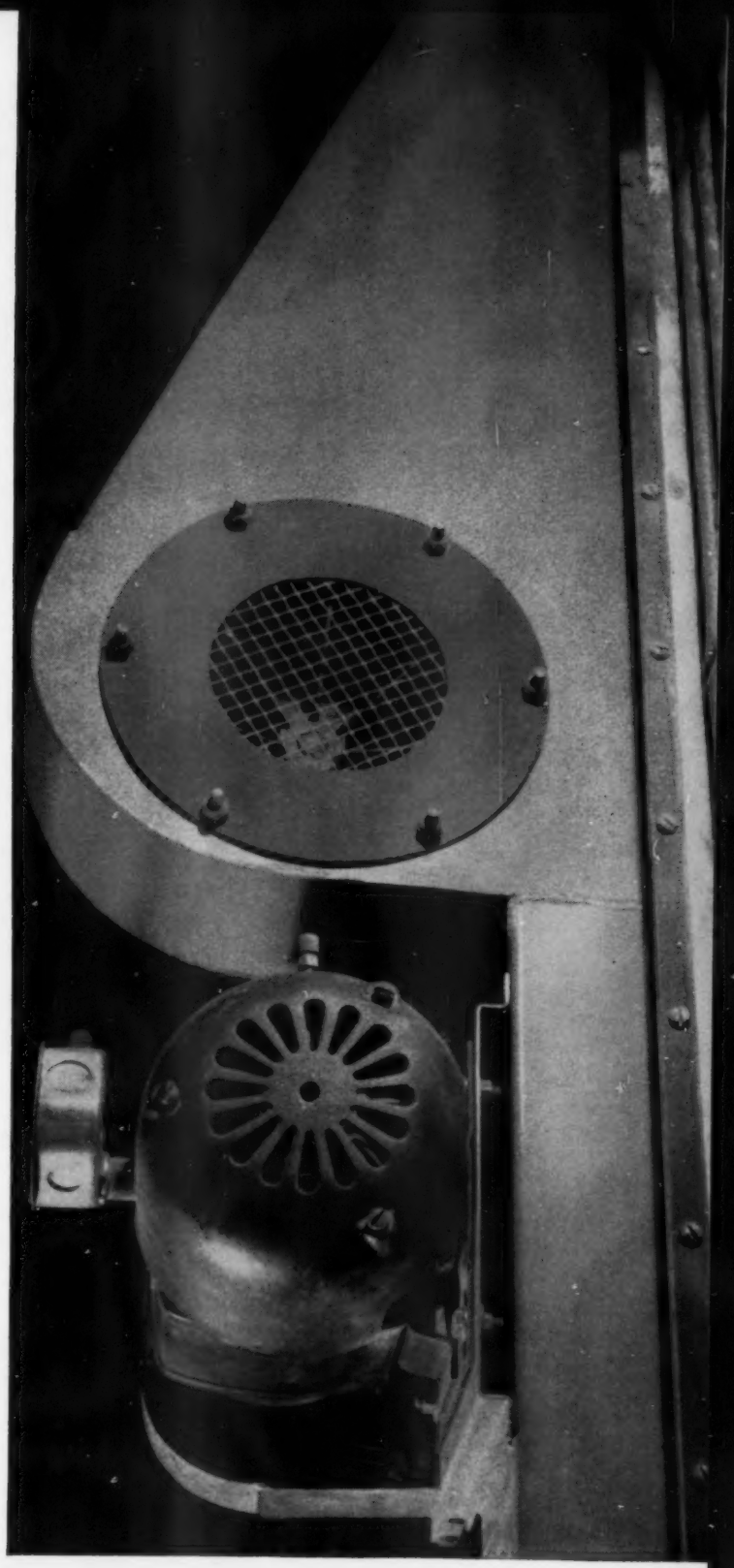
Bulletin H-5 has all the facts on the RCD brake and P&H Hevi-Lift hoists. Get it from your P&H Hoist distributor. Or write Dept. 203C, Harnischfeger Corp., Milwaukee 46, Wisconsin.

HARNISCHFEGER

P&H ...quality and service for 74 years

For more facts circle 576 on Reply Card

You're looking at the exclusive key to continuous dust collecting!



You are inside a Pangborn Dust Collector. And this is Pangborn's traveling manifold . . . the exclusive self-cleaning development that permits continuous suction at highest efficiency. The result is the incomparable performance of cloth type collectors with minimum resistance to air flow and with no shutdown required.

Typical Pangborn engineering . . .

This advance is particularly important in collecting finely-divided dry dusts. But the Pangborn engineering it typifies is important to *any* dust-producing plant. It is not enough to place a dust collector within a plant. An efficient dust collecting system must be *scientifically* planned, designed and constructed to handle effectively a specific dust problem. This *thinking* is incorporated into every Pangborn proposal.

. . . that can help you

One of Pangborn's comprehensive line of dry and wet dust collectors can be utilized in a Pangborn-engineered dust system to solve *your* dust problem . . . whether it involves any kind of fine, coarse, dry, moist, corrosive, hot or obnoxious dusts.

The Pangborn engineer in your area will be glad to take off his jacket and go to work for you. He is a dust *expert* and will discuss your individual problem at no obligation. And, for more information, write for "Out of the Realm of Dust" to: PANGBORN CORP., 3200 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Dust Control and Blast Cleaning Equipment.*

Pangborn CONTROLS DUST

For more facts circle 577 on Reply Card

NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 217-218.

1—EPOXY PIPE is reinforced against corrosion

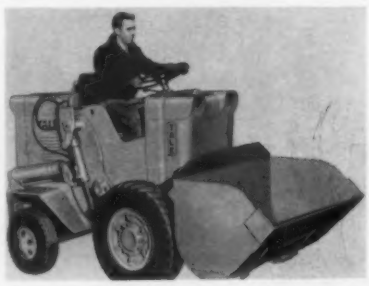
Corrosion-resistant reinforced plastic pipe, strong as steel but only one-eighth the weight, is announced in 2- to 12-in. diameters. Manufacturer uses a process employing interwoven fiber glass filaments, impregnated with epoxy resins and heat cured. Called Bondstrand, the pipe comes in rigid 20-ft lengths with ends plain, bell-

and-spigot or flanged. The pipe is described as non-toxic, non-flammable and collapse-resistant, and not subject to cold flow or sagging in use. It is suggested for most petroleum and chemical products; sewage and industrial wastes and gases; fresh and salt water; foods and pharmaceuticals; and as structural tubing and conduit. Its smooth interior surface is said to resist scale and paraffin deposits to assure full rate of flow.

Two standard series are in production, one with a nominal working pressure of 250 psi (Bondstrand 250) and another rated at 500 psi (Bondstrand 500), both with a 10-to-1 safety factor. According to manufacturer, the pipe is easily cut and joined and requires no special tools. The basic joint is made simply by placing the spigot end of one pipe into the bell end of the next. Tees, elbows and couplings also have bell openings and are made of the same glass and epoxy combination. Amercoat Corp.

2—TRACTOR SHOVEL offers greater work capacity

The Y-18 Industrial Tractor Shovel is announced as having 25 per cent greater work capacity than units presently available. Five factors contribute to this: a 2500-lb carry capacity, 500 lb more than many similar units; full 6-ft high dumping clearance; automatic torque transmission which eliminates clutch pedal and manual gear shifting and speeds operation; rapid acceleration, 0 to 8 mph in 3½ sec, with a top speed of 13 mph; a 45-deg bucket tipback at ground level to provide best possible loading action and low level carrying position. The new tractor



shovel is being introduced with a range of bucket capacities from 10 to 27 cu ft. It will also be available with a variety of attachments for specialized handling. The Yale & Towne Mfg. Co.

3—SWIVEL JOINTS for higher pressures, temperatures

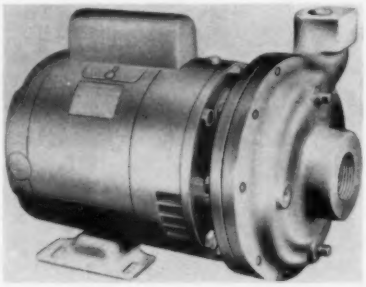
Series 750 Type S Swivel Joints for steam pressures to 750 psi and temperatures to 750 F are used to provide pivot points in pipe hook-ups to make the piping movable or flexible. Stock sizes are 1 and 1¼ in., with screwed or welding ends. To provide strength for the higher pressures, casing and retainer flange are steel, the ball is hardened steel, and the spring is stainless steel. Typical applications are on high temperature steam piping connected to moving machine or equipment parts. The gasket incorporated in the joint is made of high density carbon with a relatively low coefficient of friction, and is lapped to the ball. Movement between ball and gasket provides a constant relapping which automatically adjusts for wear, it is noted, and the gasket is installed under compression to prevent leakage. These joints may be supplied with other gaskets. Barco Mfg. Co.

4—SAMPLER KIT holds 14 kinds of special cement

Solutions to a variety of surface joining problems are offered by the 14 different types of special cements in G-C Cement Sampler Kit 345. It provides a handy assortment of desired cement formulas. Each kit contains 2-oz bottles of Service, Pli-O-Bond, Acrylic, Plastic, Bakelite, Vinylite, Grille Cloth, Model, Wood, Rubber-to-Metal, Electrical and Resistor, Neoprene, Label and Vinyl cements. Each bottle has its own applicator in the lid. The kit costs around $10 and all of the cements in it are available in larger containers. General Cement Mfg. Co.

5—CENTRIFUGAL PUMP for horizontal, vertical use

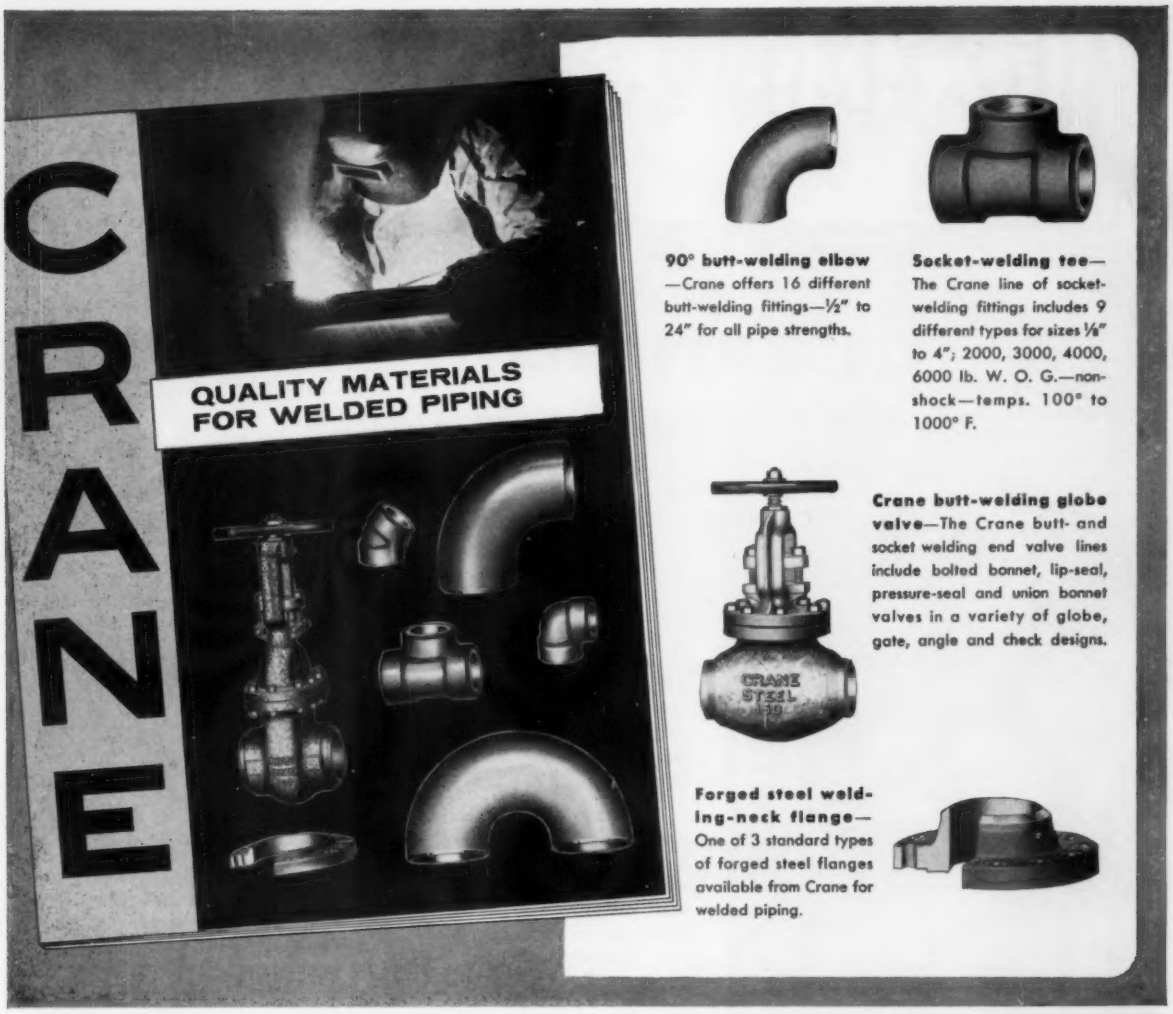
Type A5 Centrifugal Pump is of the volute type and designed for horizontal or vertical installation. It can be used as a circulator in a hot-water system, chilled water air conditioning system, or in a cooling tower installation. Typical supply system applications include boiler feed, processing, drainage,



washer service and booster service. The pumps can also be used as circulators in evaporative condensers. Motor of this pump incorporates ball-bearing dripproof frame with conduit box for easy connection, and screwdriver "holding" slot in shaft end opposite the centrifugal pump. Shaft and mounting flange comply with NEMA standards, it is noted, permitting interchangeability. The electrical system includes dual voltage, 115/230 single phase, 60 cycle with built-in thermal overload protection. For three phase, 60 cycle 208/220/440 is furnished. Thirteen sizes are offered in the range from ⅓ to 2 hp, capacities to 150 gpm. File 1440 gives data. Dunham-Bush, Inc.

6—CANVAS GLOVES have protective coating

These Koroseal-coated canvas gloves are designed for handling abrasive materials such as concrete rubble or broken brick in brick yards, tile plants, stone quarries and construction work of all types. The gloves are generously cut to assume a roomy fit and have a shell of knitted jersey for increased comfort and flexibility. Seams are lo-



90° butt-welding elbow—Crane offers 16 different butt-welding fittings—½" to 24" for all pipe strengths.

Socket-welding tee—The Crane line of socket-welding fittings includes 9 different types for sizes ⅛" to 4"; 2000, 3000, 4000, 6000 lb. W. O. G.—non-shock—temps. 100° to 1000° F.

Crane butt-welding globe valve—The Crane butt- and socket welding end valve lines include bolted bonnet, lip-seal, pressure-seal and union bonnet valves in a variety of globe, gate, angle and check designs.

Forged steel welding-neck flange—One of 3 standard types of forged steel flanges available from Crane for welded piping.

Send for this NEW Crane Circular of Welding Fittings, Flanges, Valves

A concise four-page guide to Crane's complete stocks of welding fittings, flanges and valves is available for your reference use. It provides you with a fast, accurate method of ordering *all* of your welding piping materials *from one source of supply*.

Ordering everything from Crane is your assurance that your jobs will be installed with top-quality materials throughout. Crane branch warehouses in 140 cities and Crane wholesalers throughout the country are ready to serve your requirements for welded piping materials.

Make sure that you get your copy of the new Crane Welded Piping Materials Circular quickly. Fill in and mail the coupon today. If you want an extra copy for your welding shop, check the coupon as indicated.

CRANE VALVES & FITTINGS

PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill.
Branches and Wholesalers Serving All Areas

Crane Co.
836 S. Michigan Ave., Chicago 5, Ill.

Gentlemen: Please send me ( ) a copy of your new Welded Piping Materials Circular No. AD-2289 ( ) and an extra copy for our welding shop.

Your Name_____

Firm Name_____

Address_____

City_____ Zone____ State____

For more facts circle 578 on Reply Card

SPENCER VACUUM SYSTEM

handles both { CONVEYING and CLEANING

. . . at this Metals Plant

Pneumatic Conveying of lead, zinc and copper dust here is quick, dust-free and economical. Heavy material which settles out in breeching connecting the smelter to the Cottrell drops into hoppers. Once a day these hoppers are emptied by opening a slide gate valve. The accumulated heavy dust drops into a 6″ Spencer vacuum line and is whisked back to the smelter.

General Plant Cleaning, carried on whenever system is not being used for conveying, is done with standard 1¾″ and 2″ Spencer hose and tool equipment. This bonus use of vacuum assures positive, dust-free sanitation.

Whatever **your** need in vacuum systems . . . for pneumatic conveying, cleaning, or **both** . . . it will pay to check with **SPENCER**—leader in developing systems to meet **individual** needs.

INSTALLATION DATA

Vacuum Producer: 60 H.P. Spencer.
Conveying Capacity: 7½ Tons per hour.
Primary Separator (1): 42″ with 8″ motor-driven rotary discharge valve.
Secondary Separators (2): 50″ bag type with motor-driven bag shakers, automatic sequence timers and solenoid-operated valves.

Request these informative Bulletins:
No. 143-B Spencer Pneumatic Conveying
No. 155-B Spencer Vacuum

PORTABLE VACUUM CLEANERS · BLOWERS

SPENCER

The **SPENCER** TURBINE COMPANY
HARTFORD 6, CONNECTICUT

For more facts circle 579 on Reply Card

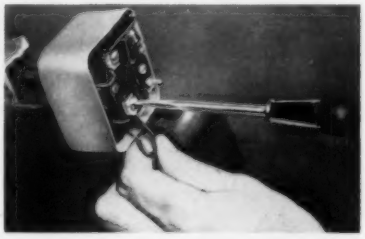
NEW PRODUCTS

(Begins on page 148)

cated on inside of fingers, a wear-reducing feature. Tan opaque in color, the Koroseal coating is said not only to resist abrasion but protect against acids, caustics, petroleum and mineral oils. Gloves are available in three styles: knit wrist, safety wrist and gauntlet models. B. F. Goodrich Industrial Products Co.

7—PRESSURE SWITCH in four enclosure styles

Series PS Pressure Switch features pressure connectors, top accessible wiring terminals, no-drift pressure settings, and four compact enclosure styles. These pressure switches, with 85 lb maximum capacity, are rated through 1 hp, 110-220 v single phase

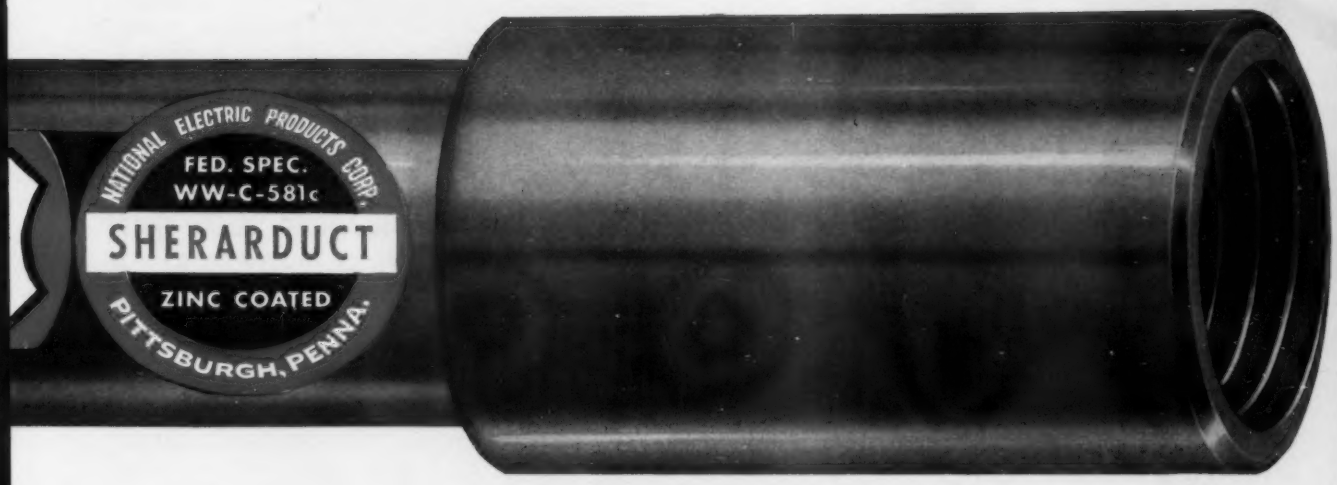


and polyphase. They are said to supply one of the most compact controls available for water pumps, low pressure air compressors, paint sprayers and other air or water systems requiring automatic control of pressure between preset limits. No wire looping is necessary with these switches. You simply insert wire under connector and tighten with screwdriver. No-drift pressure settings are accomplished with a lever bearing in the switch mechanism. The control mechanism is claimed capable of generating an initial contact pressure five times greater than that of contact spring alone. Catalog 5516B gives details. Furnas Electric Co.

8—DOOR OPERATOR is compact, automatic unit

The entire mechanism of this door operator is contained in a compact unit, not much larger than an ordinary door check. Installation consists only of attaching the door operator to the door, then making a few electrical connections. The operator is as readily applied to existing doors as to new construction. It is available with either mat switches or photoelectric controls. According to manufacturer, the instant a person steps on the mat leading through the door, or interrupts the photoelectric beam of light, the door opens, stays open until passage is

HERE'S *double* PROTECTION



NOW galvanized Sherarduct is coated with NEW

FORMULA MVC-1

the modified vinyl copolymer that provides the most effective barrier against corrosive agents of all kinds

National Electric has developed a new way to combat conduit corrosion. It is called Formula MVC-1, a new modified polyvinyl chloride resin coating that's available only from National Electric.

Here's what MVC-1 does to even further increase the protection against corrosion offered by the Sherardizing process of galvanizing.

RESISTANCE TO CORROSIVE ATTACKS—In accelerated salt spray, sulphuric acid and caustic tests conducted by the Pittsburgh Testing Laboratories, new Sherarduct with Formula MVC-1 far outlasted all hot dipped and other high-grade coated and galvanized conduits tested.

RESISTANCE TO FLAKING—Formula MVC-1 makes a tight, uniform, adhesive coating that withstands bending without cracking or flaking.

TEMPERATURE RESISTANCE—Formula MVC-1 is extremely resistant to high and low ambient temperatures and will withstand the majority of all industrial temperature conditions.

NOW ADD THIS NEW CORROSION RESISTANCE TO SHERARDUCT'S OTHER FEATURES

1. The Sherardizing process of galvanizing that alloys zinc with the conduit walls.
2. Normalized, highly ductile steel for easy bending and threading.
3. Zinc protected threads for complete end-to-end protection.

These are the features that convince architects, engineers and contractors it is best to specify National Electric Sherarduct when real corrosion protection is required. Write for complete information on new Sherarduct today.

Listed by Underwriters' Laboratories, Inc.

Sherarduct *with MVC-1* **is Galvanized Conduit at Its Best**

NATIONAL ELECTRIC PRODUCTS NE WIRING SYSTEMS

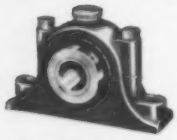
National Electric Products

PITTSBURGH, PA.

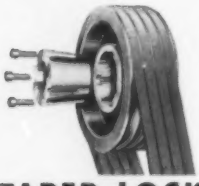
2 Plants • 12 Warehouses • 41 Sales Offices

For more facts circle 580 on Reply Card

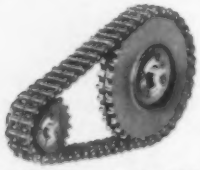
DODGE PRODUCTS you should know



DODGE-TIMKEN
America's Quality Pillow Blocks!



TAPER-LOCK
SHEAVES
Easy on — easy off! Mount flush!



TAPER-LOCK
SPROCKETS
No reboring — no waiting!

●

Write for Bulletins!

- Roller Bearings. Load ratings, dimensions, etc. Bulletin A-638.
- Taper-Lock Sheaves. Drive tables and technical data. Bulletin A-661.
- Taper-Lock Sprocket and Dodge Roller Chain data. Bulletin A-644.

DODGE MANUFACTURING CORPORATION
2700 Union Street • Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

For more facts circle 581 on Reply Card

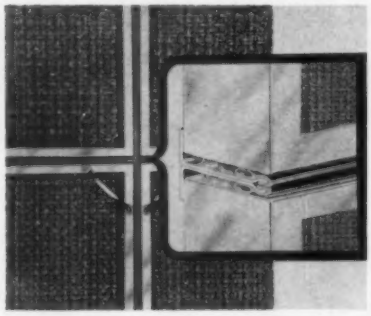
NEW PRODUCTS

(Begins on page 148)

cleared, then closes automatically. Details are in Bulletin PD 568. Electronics Corp. of America.

9—FILTER BANK with built-in polyvinyl gasket

This low cost filter bank assembly features a Seal Tight filter frame with polyvinyl gasket. This frame is said to provide a lifelong dust-tight seal between filter and filter-holding frame. The gasket pressure-locks filter into the frame, eliminating need for locking attachments. It exerts an inward pressure toward the air filter of 4.1 lb per lineal inch, molding itself to the



contour of the filter, and maintains this sealing pressure against the filter. The gasket is not affected by oil or moisture, says manufacturer; it does not support combustion and will withstand years of filter changes and still maintain a grip on the filters.

The lower cost holding frames are heavy-gage steel, double enameled. The Seal-Tight gasket is built into the front of the air inlet side and serves to provide a positive grip which holds the filter in the frame and seals it on all sides. Filter bank frames fasten in three places on each side with machine screw and self-locking nuts. Assembly or disassembly is accomplished with screwdriver and wrench. Manufacturer says this holding frame eliminates possibility of cracks around the filter that would decrease efficiency. The frame is designed for use with company's all-aluminum air filters. The George Evans Corp.

10—GREY GLASS UNIT offers year round comfort

Twin-ground neutral grey polished plate glass is now available in cushion-framed metal-edge Thermopane. The product is furnished in a combination of one light of twin-ground Parallel-O-Grey polished plate ¼-in. outboard and one light of regular polished plate ¼-in. glass inboard in sizes up to 50 sq ft. The Parallel-O-Grey polished plate glass is designed to meet the demand for a neutral low light transmittance glass which reduces glare and brightness, and for a heat-absorbing glass which reduces solar heat input. When combined in a Thermopane unit, there is the added benefit of heat and sound insulation, manufacturer states. The unit is enclosed in a channelized aluminum frame with cushion material to protect edges of the glass and the metal seal. Libbey-Owens-Ford Glass Co.

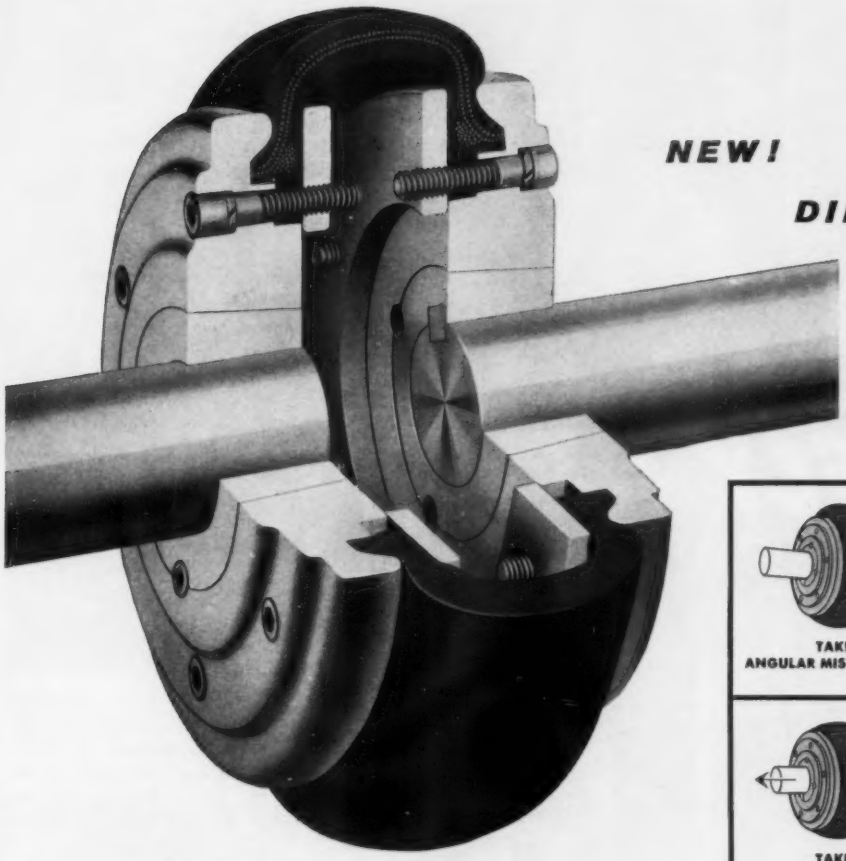
11—PUSH-BUTTON SPRAY retouches the power tools

For retouching the surfaces of Delta and Walker-Turner industrial power tools, this spray and container weigh 12 oz, cost less than $2.00. The spray is described as high-quality gray enamel color-blended to match the finish of the tools. It is intended primarily for covering scrapes, nicks, scratches, chips and spots—and for preventing rust on exposed areas. Delta Power Tool Div. Rockwell Mfg. Co.

12—MAGNETIC CONVEYOR hauls small parts "uphill"

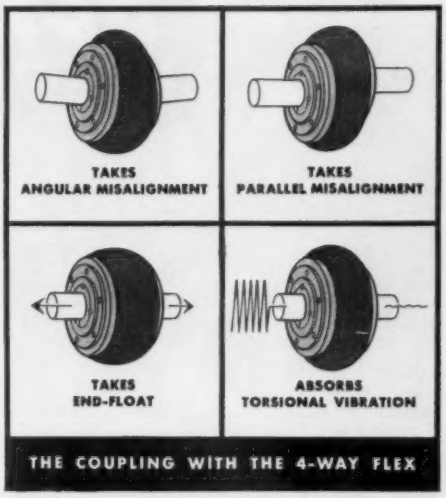
Conveying of lightweight ferrous metals at a 45-deg incline is simplified by the Rapistan Model 850, a magnetic parts conveyor. It is designed to convey small parts from a nail heading machine, automatic screw machine or punch press, and to elevate the material to discharge into a container or onto another conveyor. The conveyor bed is an aluminum formed box channel, and has two permanently-energized magnets. A magnetic field is maintained throughout the bed length, including nosed-over portion.

Standard belt is 8-in. wide ribbed Neoprene black, three-ply duck. Conveyor and motor are mounted on tubular framing and there are two 5-by-1½ in. Nicro steel wheels on the base. When the unit is in operating position, the wheels are slightly elevated so that the unit rests on the tubular stand.



NEW!

DIFFERENT!



DODGE

Para-flex

FLEXIBLE CUSHION COUPLING

THIS coupling "swallows up" shaft misplacements. It automatically compensates for end-float, parallel misalignment, angular misalignment *or any combination of all three.* Moreover, it cushions the stresses of shock loads. And it absorbs torsional vibration—reducing noise and protecting machinery from vibration's destructive forces.

Here is a new type of performance—made possible by the development of a tire-like flexing element. Synthetic tension members, bonded together in rubber, give this element the stamina and dependability of modern, high-speed, high-load, shock-absorbing truck tires—and the ability to respond magically to all manner of changing shaft conditions.

Para-flex takes minimum space on the shaft. Mounting is simplified through the use of standard Taper-Lock bushings—no reboring, no machining. Safety is promoted by flush design; there are no protruding parts. No lubrication is required, no periodic inspection. And since the flexible member is molded with a transverse split, it can be replaced *without moving either the driver or driven machine.*

Para-flex Couplings are stocked by Dodge Distributors in popular transmission sizes. They are available from factory stock in capacities up to 825 hp at 1200 rpm. Call your distributor for early delivery to *make your own test.* You'll witness something revolutionary!

DODGE MANUFACTURING CORPORATION, 2700 Union, Mishawaka Ind.

DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER—your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look in the *white* pages of your telephone directory for "Dodge Transmissioneer."

For more facts circle 582 on Reply Card

Insulator Maker
Saves with
SLY
DUST FILTERS
Sly Filter collects dust from mixers and slip house.
Dust from mixers is drawn through ducts to filter.

Sly Filter handles 32,452 c.f.m.—keeps sawing and machining operations dust-free.

No Dust Throughout the Processing Cycle

At this company, worker morale and efficiency remain high and overall plant maintenance costs low. The reason: annoying, destructive dust created in making electrical insulators cannot escape to cause discomfort to employees or damage to equipment. Three Sly Dust Filters collect *all* the dust from ball mills and slip house, from mixing machines and storage bins, and from a multiplicity of sawing and machining operations.

NEW! "ROLL-CLEAN" DYNACLONE

Now, all the advantages of the original self-cleaning, continuously operating dust filter — *plus:*

• Easier filter bag changing • Greater cloth area • Complete dust seal — automatic seal adjustment • Free-rolling cleaner — no sliding • Fewer operating parts • Easy access to all parts.

Get complete details. Send for
NEW 36-PAGE BULLETIN 104

SINCE 1870 SLY
THE W. W. SLY MANUFACTURING CO.
4600 TRAIN AVENUE • CLEVELAND 1, OHIO
OFFICES IN PRINCIPAL CITIES

For more facts circle 583 on Reply Card

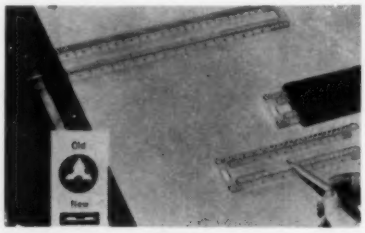
NEW PRODUCTS

(Begins on page 148)

Controls available include a manual one-way start-stop switch or one-way magnetic control with push-button station for remote control. The Rapids-Standard Co., Inc.

13—FLIPLESS SCALE has eight on one side

This ingenious scale displays all eight scales on a single side. It doesn't have to be "flopped" or twirled. Whatever scale is needed is right at your pencil-tip, because all are laid out side-by-



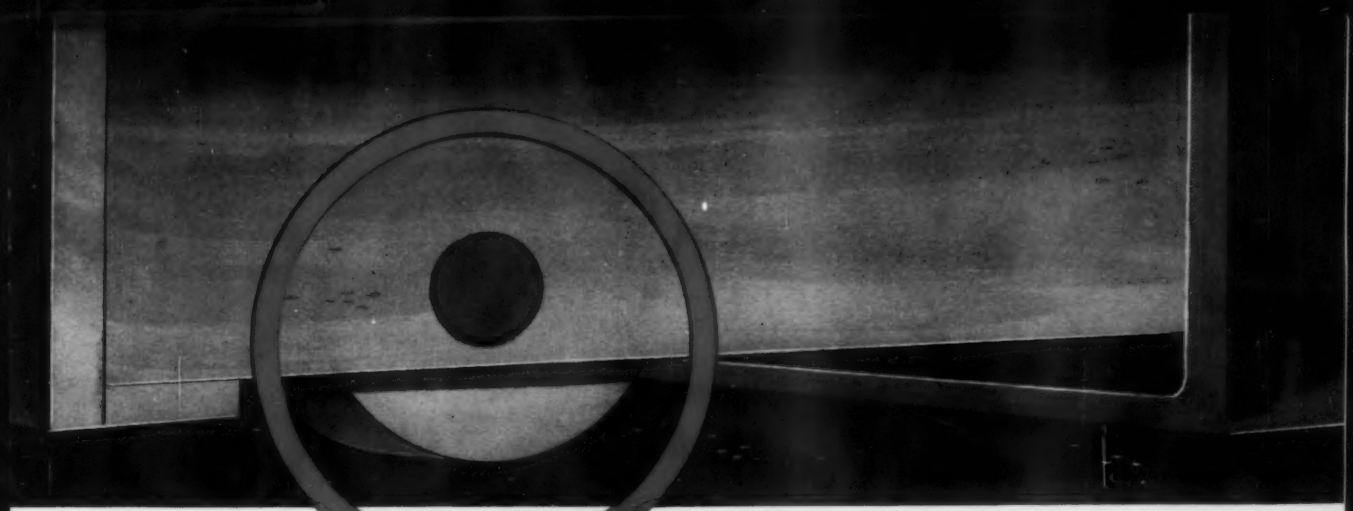
side, instead of one under the other and each has its own straightedge. Of clear acrylic, the instrument is offered in a 6-in. leather sheathed pocket model costing around $2.25 and an unsheathed 12-in. desk model, around $3.00. Both carry graduations of ⅛, ¼, ⅜, ¾, ½, 1, 1½ and 3 in. to the foot. A. Lawrence Karp.

Reader Service Cards on pages 217-218 make it easy to get further information on any of these products. Just circle the item numbers of the products you would like to know more about.

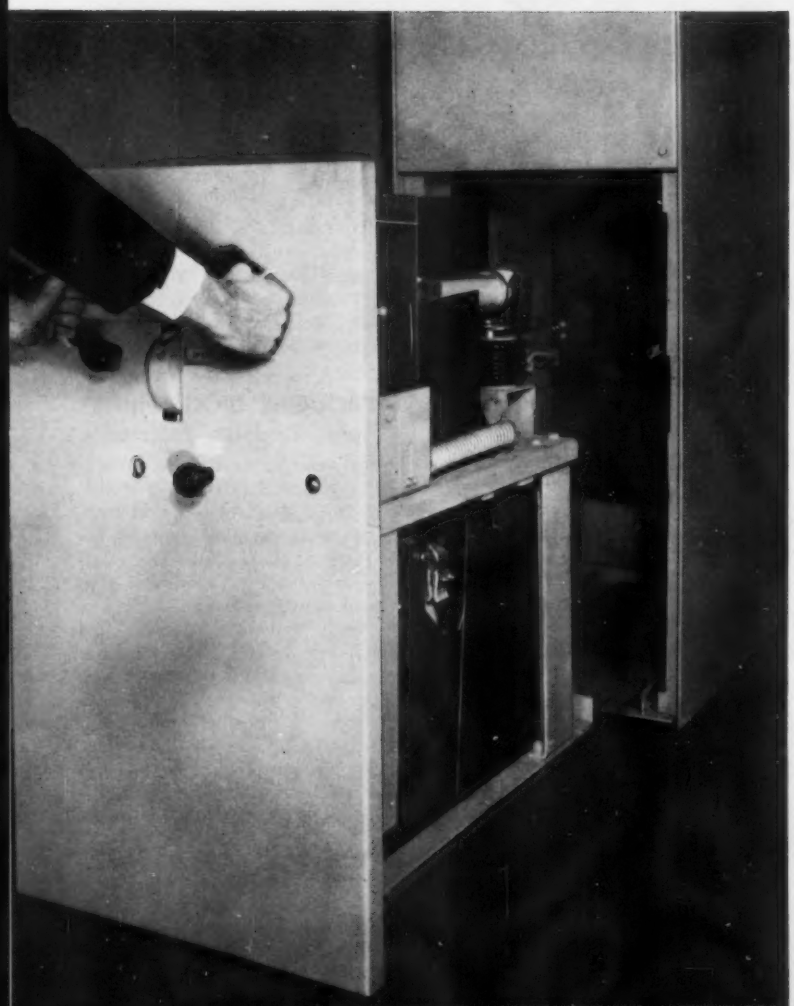
14—INTERCOM SYSTEM for use in noisy areas

GTC is an industrial, dual channel, voice communication system for noisy-area use. This transistorized intercom requires no central amplifier or control equipment. Telephone type handset stations and loudspeaker assemblies connected by two pairs of No. 18 unshielded wire plus a 115-v a-c power source comprise the system. This is said to result in greatly simplified installation and maintenance. Handset stations and speaker assemblies each have their own "plug-in" printed circuit transistor amplifier.

Manufacturer points out that the indoor units are dust tight and the outdoor units weatherproof as well, and that handsets employ noise-canceling



Simple maintenance, inspection with General Electric ROLLOUT Switch and Fuse Equipment



It's new—General Electric Rollout Switch and Fuse Equipment. It rolls out like a file cabinet drawer—allows simple, fast inspection and maintenance. Plus—improved protection, greater safety, and installation flexibility.

For more information on this new Rollout Switch and Fuse Equipment call your nearest General Electric Apparatus Sales Office or write for bulletin GEA-6623, General Electric Company, Schenectady, New York.

514-2

Progress Is Our Most Important Product

GENERAL ELECTRIC

NEW ROLLOUT SWITCH AND FUSE EQUIPMENT, in ratings from 2.4 kv to 13.8 kv, is applicable for both normal switching and fault current protection.

For more facts circle 584 on Reply Card

Public Enemy *

*

A small boy is lovable, laughable, delightful and **destructive.** He has a special place in his heart for industrial plants with big window areas.

Let him have his fun. Put in shatterproof Corrulux. This is the material that shrugs off rocks and baseballs, hail and windstorms—even withstands explosions. And with Corrulux, the daylight is **diffused.** No glare, no strong shadows. Your plant employees see better and produce more.

Corrulux installs easily. **For replacement glazing,** use Corrulux flat panes, pre-cut to fit standard window frames. **For general skylighting and sidelighting** use the corrugated sheets and cut down on expensive framing. Either way, you're money ahead with Corrulux. Please write for the full story. **Dept. 20**

LOF GLASS FIBERS

Corrulux®

LOF Glass Fibers Company

P. O. BOX 20026 HOUSTON 25, TEXAS

CORRUGATED SHEETS • FLAT PANES • PYROPANL • DOUBLE DOME SKYLIGHTS

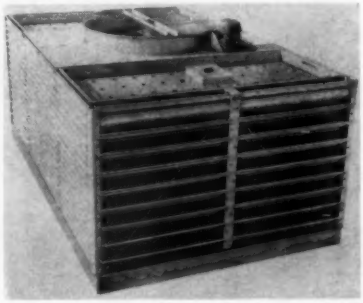
NEW PRODUCTS

(Begins on page 148)

dynamic transmitters and high efficiency receivers. Spring return pushbutton (optional locking) selects page or party-line telephone channel, both of which are common talking. Handsets and loudspeakers are used on page channel; handsets only on party-line telephone channel. GTC is reported satisfactory in locations where extreme temperatures exist. Gai-Tronics Corp.

15—COOLING TOWER is low silhouette, steel unit

Newest series in this company's Lo-Line Cooling Towers features all steel structural members that are hot-dipped galvanized, after fabrication, for extra corrosion protection. Louvers,



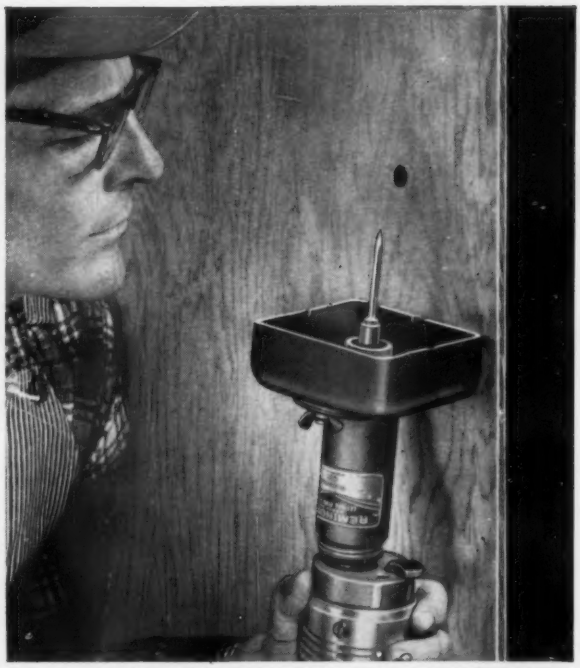
casing, distribution system and fan deck are asbestos cement, adding to the fire-safeness. Designed specially for conforming to standard metropolitan fire codes, the Lo-Line Fire-Code Tower is attractive in appearance and compliments architectural design. Heart grade redwood is used in the deck fill and drift eliminators to assure long service. Bulletin 5.2.902 gives data. J. F. Pritchard & Co.

16—WROUGHT IRON with more corrosion resistance

Seventeen-year in-service and laboratory tests of new 4-D wrought iron—not only with standard wrought iron, but with other metals, too—are reported to show greatly superior resistance against many kinds of corrosive forces including those caused by severe industrial atmosphere, acid solutions, salt water and steam condensates. According to announcement, the improved wrought iron was achieved by substantially increasing the deoxidation of the base metal; increasing the phosphorous content in relation to the other material components; and using a more siliceous silicate fiberous material. Approximately 250,000 of these silicate fibers

← For more facts circle 585 on Reply Card

If operator inadvertently fires new Remington Captive Stud Tool into inadequate base material—



Captive Stud Guard Assembly prevents free flight of stud which is locked to tool during firing.

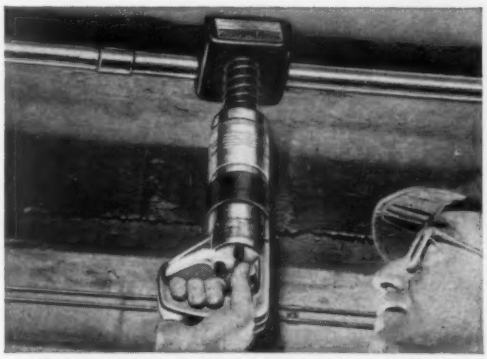
Safest Stud Driver Ever Designed!

Remington Stud Driver...with Model 440 Captive Stud Guard Assembly

Power, efficiency, speed *and safety* are features of the new Remington Stud Driver with Captive Stud Guard Assembly. It's designed to prevent free flight of studs through a working surface... permitting use of the tool in a whole new range of fastening situations.

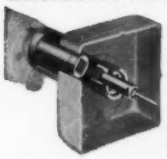
Just squeeze the trigger to anchor wood or metal sections to concrete or steel with ¼" diameter Remington Studs. Scientifically graded 22 caliber Power Loads furnish *exact* driving force you need to do the work. No pre-drilling, no outside connections required!

What's more, you can choose from a *complete* selection of ¼" diameter Remington "Power-Guide" Studs. And for particular applications involving repetitive use, you may prefer one of 15 special-purpose guards to adapt the versatile Stud Driver to *your* job requirement!



JUST SQUEEZE TRIGGER to anchor conduit clips to concrete walls and ceilings with this *new* Stud Driver! You can take the tool anywhere, use it anywhere for all your light, medium and heavy-duty fastening jobs.

Exclusive Remington Captive Stud Guard Assembly has new "Safety-Zone"



Heart of the Captive Stud Assembly is combination of square-headed piston and aluminum alloy buffer. Piston is abruptly halted by buffer when base material is inadequate to stop the stud. Remember: If it's the Remington Captive Stud tool, it's the safest Stud Driver on the market!

Remington DU PONT

STUD DRIVER

Remington Arms Company, Inc., Bridgeport 2, Connecticut

Mail coupon for free booklets

Industrial Sales Division,
Dept. PE-4
Remington Arms Company, Inc.
Bridgeport 2, Connecticut

Please send information about the new Remington Stud Driver and Model 440 Captive Stud Guard Assembly.

Name.....

Firm.....*Position*.....

Address.....

City.....*State*.....

For more facts circle 586 on Reply Card

Yes, that's a strong promise. But it's being done right now in plants like yours. Here's how:

Match the requirement of your job with a custom-built Reading crane at no extra cost

Imagine, at what you'd normally pay for an "ordinary" crane, you can actually have one "tailor-made" for your own plant. For when you order a READING CRANE, our engineers offer you a choice of several interchangeable motor, trolley and hoisting units.

Known as UNIT CRANE DESIGN, this unique construction method assures greater operating efficiency. It enables you to move more materials at the lowest possible cost. And it helps you reduce maintenance time and save maintenance dollars—any unit can be removed for overhauling or repair without dismantling any other unit!

READING CRANE & HOIST CORPORATION 2103 Adams St., Reading, Pa.

READING CRANES

CHAIN HOISTS | OVERHEAD TRAVELING CRANES | ELECTRIC HOISTS

For more facts circle 587 on Reply Card

NEW PRODUCTS

(Begins on page 148)

are distributed throughout each cross sectional square inch of the metal. In addition to increased corrosion resistance, tests of 4-D wrought iron are reported to show greater uniformity plus improved physical and mechanical properties. It is expected to sell for the same price for which standard wrought iron has been sold, manufacturer states. A. M. Byers Co.

17—MULTI-LINK MAT resists the oils and greases

This oil and greaseproof multi-link mat is designed to provide safe non-skid footing for industrial floors. The multi-link matting is custom-made with links strung on parallel non-rusting spring steel rods. Links, nosing and edging are made of the same oilproof material and available only in a brown color. B. F. Goodrich Industrial Products Co.

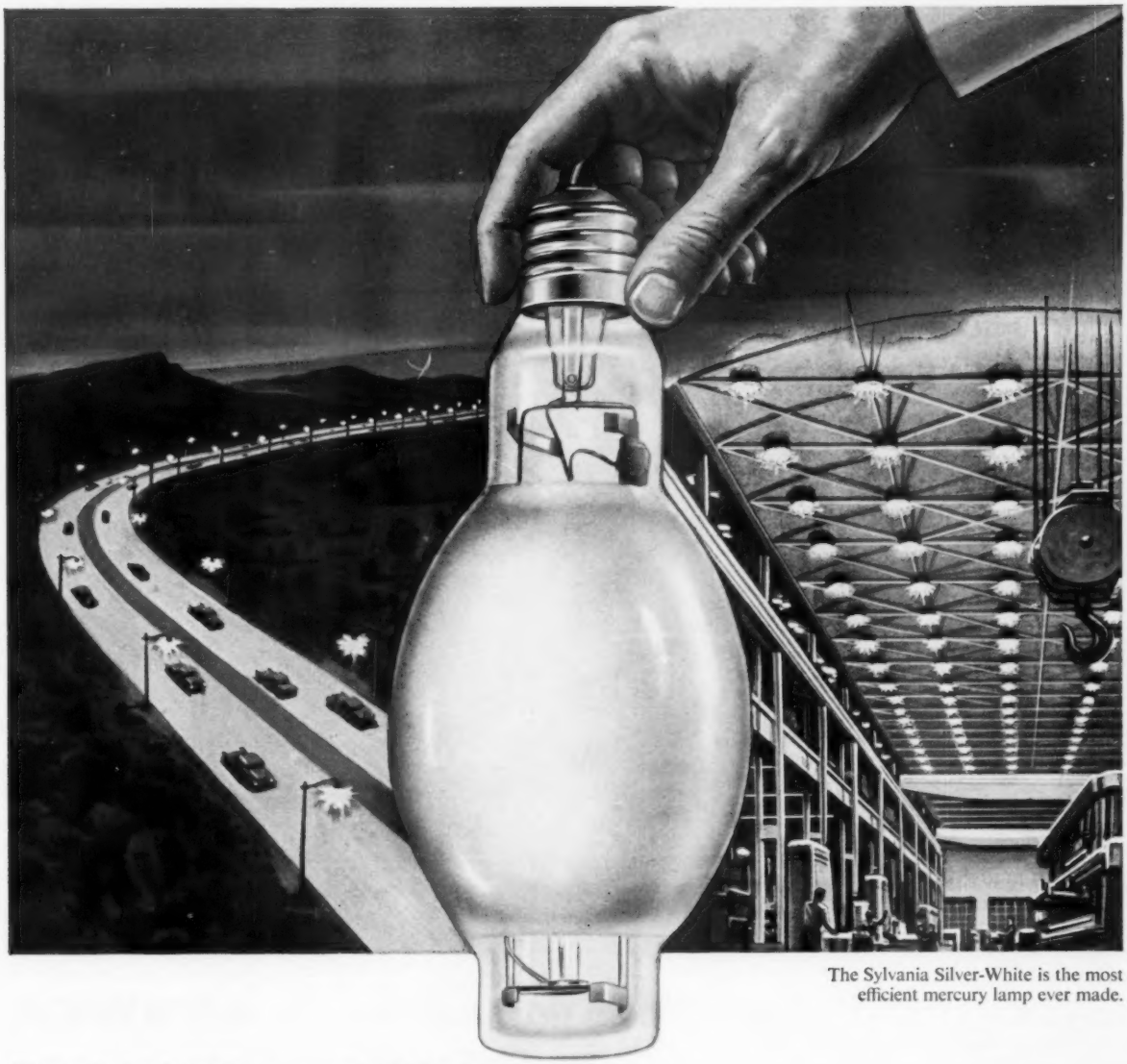
18—CABLE TROUGH offered in expanded aluminum

This expanded aluminum cable supporting system includes a wide range of standard fittings to provide simplicity, flexibility and low cost in installation. Among advantages claimed for aluminum cable trough is its light

weight, which reduces installation costs as entire sections may be lifted into place after assembly and awkward spaces are reached more easily, and its resistance to many corrosive atmospheres. The aluminum trough is manufactured with solid sides for greater strength. Sections are secured by flat pins driven between interlocking barrels. Straight lengths are available in widths of 6, 9, 12, 18 and 24 in. and in 8-, 10-, and 12-ft lengths. T. J. Cope Div., Rome Cable Corp.

19—SCHEDULE SHEETS are aid in production planning

Schedule Pal is a three-ring bound notebook containing 8½-by-11 in. schedule sheets. Each sheet handles five jobs for the period of one week. By using succeeding sheets, production



The Sylvania Silver-White is the most efficient mercury lamp ever made.

For highway . . . or high-bay

. . . the one-lamp answer to both lighting needs

Today's most efficient mercury-vapor lamp is the new Sylvania Silver-White.

The greater light output and superior color quality of the Silver-White makes it an effective, versatile lighting source . . . it serves the high requirements for such widely different applications as highway lighting and high-bay plant illumination with unequalled efficiency.

Sylvania's Silver-White actually delivers up to 33% more lumens of light than previous color-improved mercury-vapor lamps. The 100-watt lamps, for example, are producing an unprecedented 4000 lumens in actual installations.

Sylvania Silver-White lamps cost no more than conventional color-improved lamps—but offer the combined economies of superior light output and superior construction.

Silver-White lamps are available in 100-, 175-, 400-, 700-, and 1000-watt types to meet the needs of industry for efficient high-bay indoor lighting and outdoor illumination for parking and loading areas . . . and for the governmental requirements for effective highway lighting.

For complete information about the Sylvania Silver-White Mercury Vapor lamp, call your local representative, or write:

SYLVANIA ELECTRIC PRODUCTS INC.
Lighting Division, Dept. 8L-7004
60 Boston St., Salem, Mass.
In Canada: Sylvania Electric (Canada) Ltd.
Shell Tower Building, Montreal

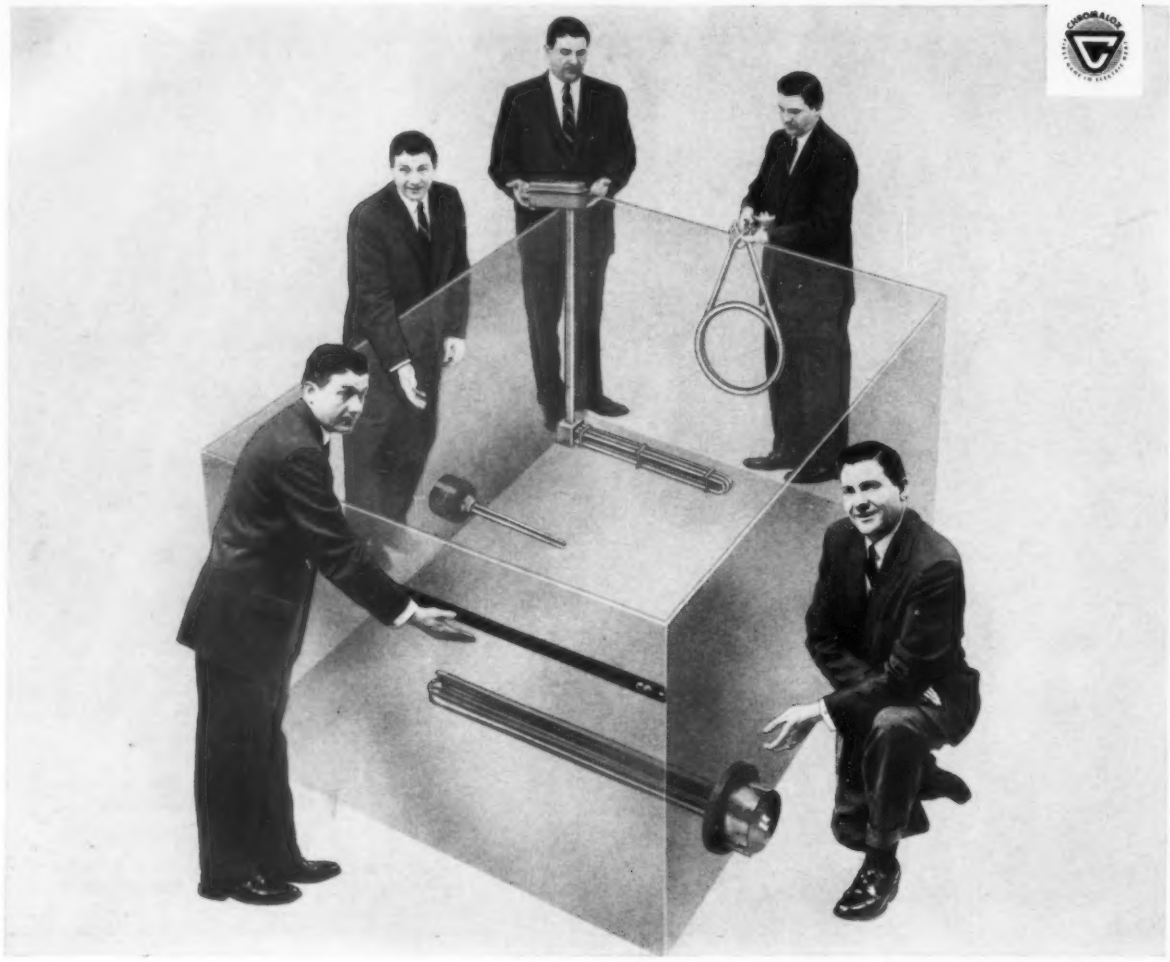
SYLVANIA

. . . the fastest growing name in sight

LIGHTING • RADIO • ELECTRONICS • TELEVISION • ATOMIC ENERGY

For more facts circle 588 on Reply Card

What's the best way to heat a tank?



Your Chromalox man has the **ANSWER**

Trying to heat a tank with steam or combustible fuels often presents rough problems, costs needless time and money and leads to ineffective results. But 97 times out of 100 there is a quick and effective electric answer—and your "CHROMALOX man with the answers" has it. Here, for example, are five ways of heating a tank—each presenting significant advantages, and using stock industrial heaters in most instances.

- In the foreground, CHROMALOX Strip Heaters are clamped to the tank wall, heating by conduction, without contacting the tank contents. Tank interiors have full work space—cleaning is simplified.
- Moving clockwise: CHROMALOX Screw-Plug-Immersion Heaters, with standard pipe threads, go to work quickly in heating water and corrosive solutions. Heavy-duty elements of steel, copper, stainless steel, or alloy, all in correct watt density, have proper chemical characteristics.
- Next: Portable Tank Immersion Heaters require no tank openings. They put the heat down to the very bottom of the tank—and they are constructed for trouble-free life with moisture, heat, and acid-resistant parts and joints.
- Next: Coiled over-the-side heaters, for full but shallow tanks, produce good circulation and uniform temperatures. Various sheaths resist practically all chemicals.
- Next, at right front: a High-capacity Flange-Type Heater packs many kilowatts in a small space, particularly in water solutions. The heavy-duty flange simplifies installation.

So what's YOUR heating problem? Just call your CHROMALOX representative, listed opposite. He has the fast, clean, safe, accurate, economical ELECTRICAL ANSWER, backed by the world's largest stock of industrial electric heaters for immediate shipment, plus factory design engineering services.

2640-A

CHROMALOX® Electric Heat

Edwin L. Wiegand Company

7553 Thomas Boulevard, Pittsburgh 8, Pennsylvania • CHurchill 2-6400

For more facts circle 589 on Reply Card

Call Chromalox

for the man with the
ELECTRICAL ANSWERS
to your heating problems

ATLANTA 9, GA.
Applebee-Church, Inc.
1389 Peachtree St., N.E.
TRinity 5-7244

BALA-CYNWYD, PA.
J. V. Calhoun Co.
349 Montgomery Ave.
MOhawk 4-6113

BALTIMORE 18, MD.
Paul B. Renoff Co.
333 E. 25th St.
HOpkins 7-3280

BINGHAMTON, N. Y.
R. P. Smith Co., Inc.
2507 James Street
Phone 4-7703

BLOOMFIELD, N. J.
R. L. Faber & Associates, Inc.
1246 Broad Street
EDison 8-6900

BOSTON 11, MASS.
Leo C. Pelkus and Co., Inc.
683 Atlantic Ave.
LIberty 2-1941

BUFFALO 2, N. Y.
Niagara Electric Sales Co.
505 Delaware Avenue
SUmmer 4000

CHARLOTTE 2, N. C.
Ranson, Wallace & Co.
116½ East Fourth St.
EDison 4-4244
FRanklin 5-1044

CHATTANOOGA 1, TENN.
H. R. Miles and Associates
P. O. Box 172
Phone 5-3862

CHICAGO 5, ILL.
Fred I. Tourtelot Co.
407 S. Dearborn Street
HArrison 7-5507

CINCINNATI 8, OHIO
The Smysor Company
1046 Delta Avenue
TRinity 1-0605

CLEARWATER, FLA.
J. J. Galleher
617 Cleveland Street
P. O. Box 1376
Phone 3-7706

CLEVELAND 13, OHIO
Anderson-Bolds, Inc.
2012 W. 25th Street
PRospect 1-7112

DALLAS 28, TEXAS
L. R. Ward Company
3009-11 Canton Street
RIverside 1-6279

DAVENPORT, IOWA
Volco Company
215 Kahl Bldg.
Phone: 3-2144

DENVER 2, COLO.
E. & M. Equipment Co.
2415 15th Street
GLendale 5-3651
GEnesee 3-0821

DES MOINES 14, IOWA
Midwest Equip. Co. of Iowa
842 Fifth Avenue
CHerry 3-1203

DETROIT 38, MICH.
Carman Adams, Inc.
15760 James Couzens Hwy.
UNiversity 3-9100

HOUSTON 3, TEXAS
L. R. Ward Company
3605 Polk Avenue
CApitol 5-0356

INDIANAPOLIS 4, IND.
Couchman-Conant, Inc.
627-631 Architects &
Builders Bldg.
MElrose 5-5313

KANSAS CITY 8, MO.
Fraser D. Moore Co.
106 E. 14th Street
VIctor 2-3306

LOS ANGELES 15, CALIF.
Montgomery Brothers
1053 South Olive Street
RIchmond 7-9401

MIDDLETOWN, CONN.
Dittman and Greer, Inc.
33 Pleasant Street
DIamond 6-9606

MILWAUKEE 3, WIS.
Gordon Hatch Co., Inc.
531 W. Wisconsin Avenue
BRoadway 1-3021

MINNEAPOLIS 4, MINN.
Volco Company
831 South Sixth Street
FEderal 6-3373

NASHVILLE 4, TENN.
H. R. Miles and Associates
2500-B Franklin Road
CYpress 2-7016

NEW YORK CITY, N. Y.
See "Bloomfield, N. J."
WOrth 4-2990

OMAHA 2, NEB.
Midwest Equipment Co.
of Omaha
1614 Izard Street
ATlantic 7600

PHILADELPHIA, PA.
See "Bala-Cynwyd, Pa."
GReenwood 3-4477

PITTSBURGH 6, PA.
Woessner-McKnight Co.
1310 Highland Bldg.
115 S. Highland Avenue
EMerson 1-2900

PORTLAND 9, ORE.
Montgomery Brothers
1632 N.W. Johnson Street
CApitol 3-4197

RICHMOND 28, VA.
(Branch, Charlotte)
ATlantic 8-8758

ROCHESTER 4, N. Y.
Niagara Electric Sales Co.
133 Clinton Avenue, South
HAmilton 6-2070

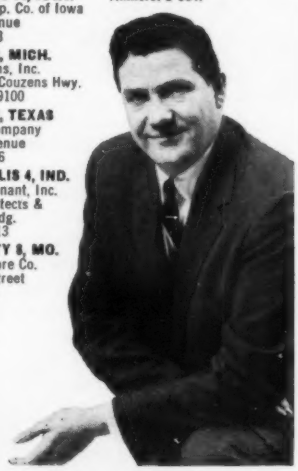
ST. LOUIS 1, MO.
C. B. Fall Company
317 N. 11th St., Suite 1001
CHestnut 1-2433

SAN FRANCISCO 3, CALIF.
Montgomery Brothers
1122 Howard Street
UNderhill 1-3527

SEATTLE 4, WASH.
Montgomery Brothers
911 Western Avenue
SEneca 3270

SYRACUSE 6, N. Y.
R. P. Smith Co., Inc.
2507 James Street
HOward 3-2748

WICHITA 2, KANS.
Fraser D. Moore Co.
Room 211 Derby Building
352 N. Broadway
AMherst 2-5647



NEW PRODUCTS

(Begins on page 148)

of work may be scheduled for six months or longer. The form is so designed to project the schedule of work orders for any length of time required. Provision has also been made to note the actual progress of work from day to day directly under the projected schedule. A complete 1958 calendar is printed on back of each schedule sheet which allows calendar to face each schedule in binder. Calendar will be changed every six months. Air-Com Printers.

20—PLASTIC PIPE wears a welded steel jacket

Jal-Jacket is described as combining strength of steel with chemical resistance of plastic. It consists of a rigid polyvinyl chloride tube jacketed with an electric resistance welded steel pipe. Jal-Jacket is expected to find wide application where corrosion is a problem, particularly in the petroleum industry. Polyvinyl chloride was chosen as the liner material because of its recognized resistance to a broad range of corrosive fluids. By using a steel jacket, the limitation of pressure common to most plastic pipe is overcome, manufacturer states, and working pressures of 1000 psi at 150 F attained.

Jal-Jacket is so designed that the pipe-ends as well as the inside surfaces are continuously protected. Victaulic couplings which lock into mill-rolled grooves are used for positive seal and quick make-up.

Several advantages are cited for the steel-jacketed PVC pipe. The smooth surface of the plastic results in a lower friction coefficient and h'gher flow efficiency enabling, in some cases, the use of a smaller diameter pipe than normally requires. Chemical Characteristics of the PVC let the pipe handle many corrosive fluids and minimize problem of paraffin build-up. The strength of steel lowers installation costs by eliminating need for trenching or for close spacing of supports. The system of joining permits entire systems of the pipe to be dismantled and reassembled. Jal-Jacket will be available in 20-ft lengths in 2-, 3-, and 4-in. nominal OD sizes. Jones & Laughlin Steel Corp.

21—HARDNESS TESTER is combination unit

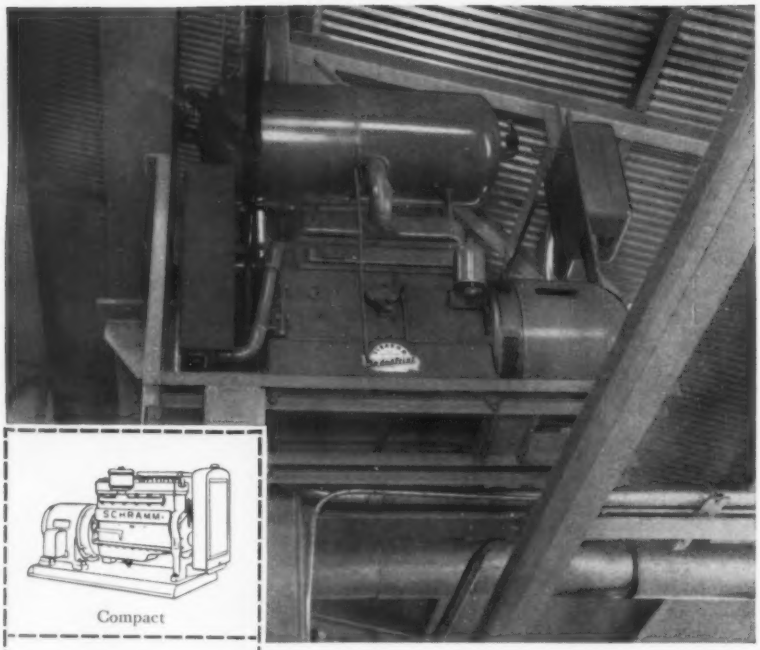
The Rockwell Hardness TwinTester is primarily intended for conducting Rockwell and Rockwell superficial hardness testing applications of materials in tool departments, maintenance repair shops and similar places requiring only limited use of hand-operated Rockwell testers. The TwinTester is a combination testing instrument claimed capable of performing

the work of two conventional single-range units in measuring the Rockwell hardness of metals and alloys of all types whether hard or soft, polished or unpolished, flat or shaped etc. According to manufacturer, it is as easy to use as a center punch, as accurate as a precision balance and as durable as a machine tool.

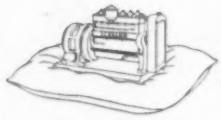
The instrument features a large direct-reading dial gage with one zero-set position with four scales: B and C to indicate Rockwell hardness and N and T to indicate Rockwell superficial hardness reading. The instrument is claimed simple in operation and you change from one testing procedure to another through the addition of subtraction of major load weights suspended from a hanger at the rear of the unit and raising or lowering the minor load weight at the top. Vertical capacity of the unit is 8, 12 or 16 in. and its throat depth is 5½ in. Wilson Mechanical Instrument Div., American Chain & Cable Co.

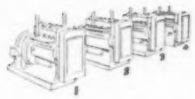
22—CURING COMPOUND seals, protects concrete

Clear Bond is a colorless quick-drying liquid that is applied to the concrete floor as soon as it has been troweled. It is designed to penetrate the concrete and form a seal on the surface that prevents moisture from es-

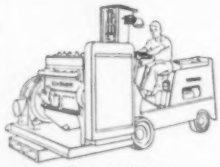


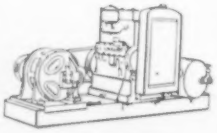
Compact


No Vibration


Unit System

No Elaborate Foundations


Easy to Move


Complete Package

COMPACT

Schramm Industrial Air Compressors Save Space

You can install Schramm Compressors *anywhere*—in minimum space—at low cost. Compact design with integral cooling system saves space every time. And you need no expensive foundations or long and costly air lines. Take advantage of unused corners for your installation. Put the compressor right on the job.

No Vibration—balanced reciprocating parts provide smooth operation, lengthen compressor life.

Unit System—no need for costly centrally located compressors and long air lines. Use only the compressors you need—add to them as requirements grow.

No Elaborate Foundations—eliminate this added cost with a vibration-free Schramm installation.

Easy to Move—change the location of your compressor whenever you need.

Complete Package—all you need for your air requirements in a single package.

For complete information, write for Catalogs GC-57 and 5510, or see your nearest Schramm Dealer.

See the Yellow Pages for local Sales, Service and Rental of Schramm Air Compressors.

Schramm, Inc.

MANUFACTURERS OF AIR COMPRESSORS

665 North Garfield Ave. • West Chester, Pa.

For more facts circle 590 on Reply Card

NEW PRODUCTS

(Begins on page 148)

caping. According to company, the liquid membrane curing compound provides an easier method of curing concrete than with wet straw, sawdust or burlap. Speed and ease of application help to reduce curing costs. The material is said to seal out construction stains and reduce cost of cleaning up after work is completed. According to test reports, it hardens and seals both new and old concrete floors, penetrating into pores to bind together particles of aggregate and cementitious material. Guardian Chemical Co.

One of these products may be "just what you're looking for." Use the handy Reader Service Cards to ask for more information on it.

23—PRECISION CASTER for extra heavy duty jobs

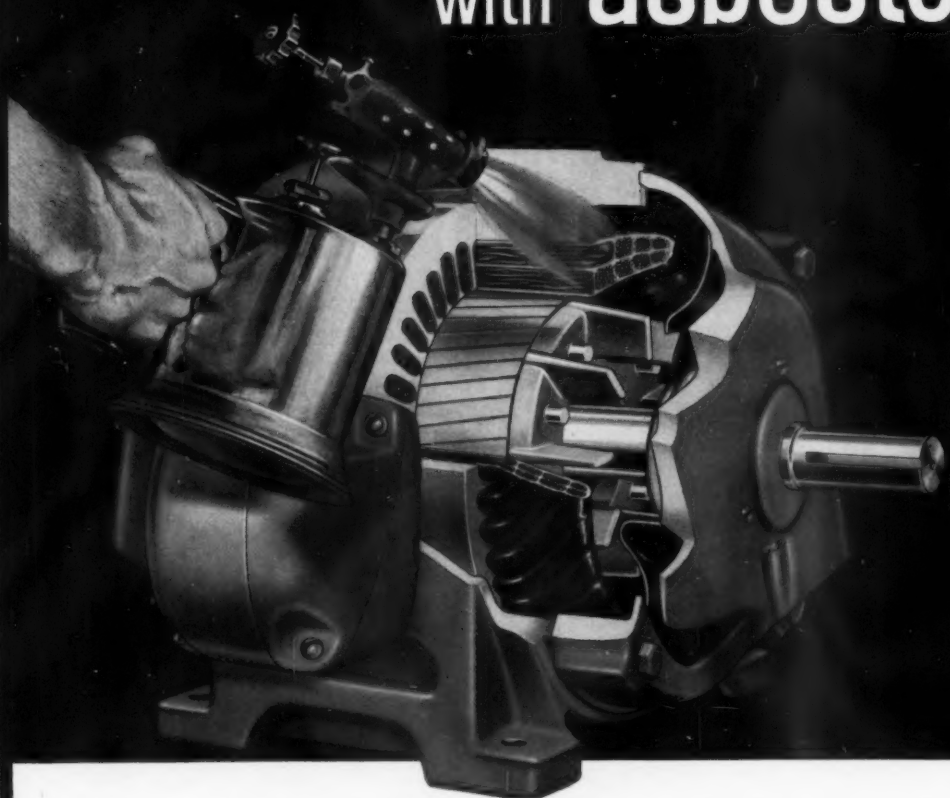
The Series HX300 is announced as an extra heavy duty precision caster which gives maximum swivel and rolling action even under loads of 5 tons per caster. It is heavily proportioned throughout with machined tread, semi-steel 8-in. or 10-in. dia. wheels. According to company, the strength features at vital points combined with bearing style and arrangement at all moving points make this caster suitable for heavy duty jobs. Faultless Caster Corp.

24—MERCURY LUMINAIRE offers extended lamp life

Designated the Form 700C, this 700-w luminaire uses clear or color-improved mercury lamps, it is announced, and offers increased lamp economy and high level of uniform illumination. Unit normally uses 1000-w mercury lamps operated at 700 w, an innovation reported to make possible longer lamp life and improved lumen maintenance. According to company, tests have shown that an average of 26,400 lumens can be maintained throughout a 12,000-hr lamp life or an average of 27,400 lumens throughout a 9,000-hr lamp life. Although designed primarily for application on whiteways, the luminaire is suggested for parking lots and other areas where a high level of illumination is required. Luminaire features a one-piece combination reflector-housing, a heat resistant borosilicate glass refractor, a slipfitter mounting. Ballasts are available for series or multiple operation. An access door in mounting arm facilitates in-

only **U. S. MOTORS**

insulates all windings with asbestos!



your best protection

against
motor burn-out
and
production
shutdowns

Only U.S. offers this protection! ALL windings insulated with asbestos—nature's million-year-old insulating material that *cannot carbonize!* Many motor makers use varnished paper, cloth, oiled linen, press-board, fish-board—even insulating varnish alone. All these will carbonize... not one is fire-proof!

Only the original, patented U.S. ASBESTIC PROCESS—gives you: 1—*Heat resistance*... can't carbonize, 2—*heat conductance* better than any cellulose material, 3—*moisture resistance*... due to exceptional impregnation and coating of windings.

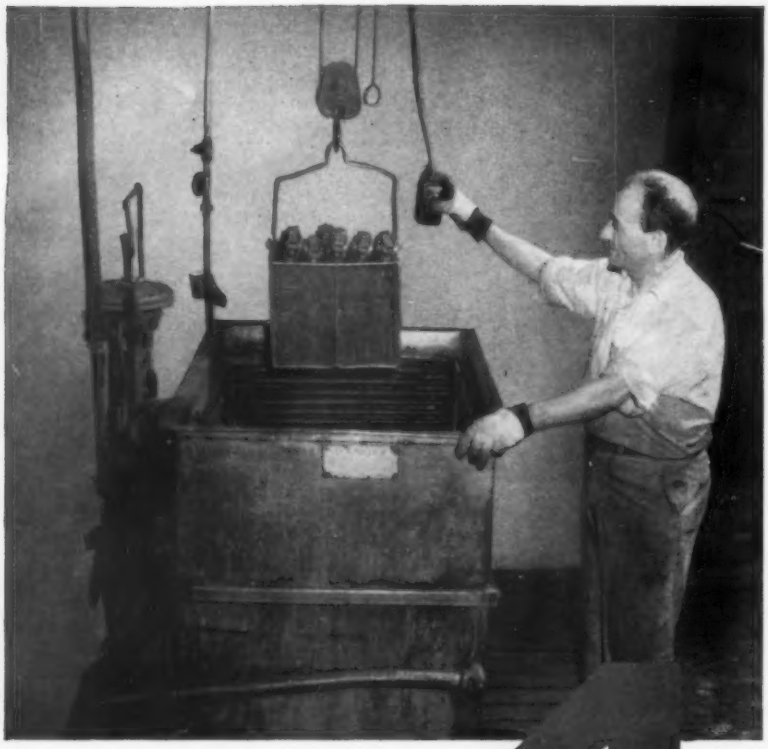
Protect yourself against costly production shutdowns due to motor burn-out! Be sure to specify: "U.S. MOTORS"!

U.S. ELECTRICAL MOTORS INC.

BOX 2058, LOS ANGELES 54, CALIFORNIA
OR MILFORD, CONNECTICUT

FREE COLOR-ILLUSTRATED BROCHURES
For specific data on asbestos protection, write for General and Type H Uniclosed Bulletins.

For more facts circle 591 on Reply Card



degreasing compounds last up to 4 TIMES LONGER with a **PUROLATOR** filter

You'll spend up to 60% less on degreasants when you filter them with a Purolator filter. The filter traps most of the contaminants, so the compound lasts up to 4 times longer. You just change the filter instead of changing the compound—much easier and much cheaper.

The compounds stay like new longer because the filter picks up the contaminants as soon as they appear, prevents them from cutting down on degreasing efficiency.

Original installation of the filter is simple, too. The motor and pump that circulate the degreasing fluid will also pump the compounds through the filter.

This is just one of the ways Purolator can help reduce operating costs and improve product quality. For further details contact your nearest Purolator Industrial Sales Agent, or the Purolator Industrial Sales Division, Rahway, N. J.

Filtration For Every Known Fluid

PUROLATOR

PRODUCTS, INC.

RAHWAY, NEW JERSEY AND TORONTO, ONTARIO, CANADA

For more facts circle 593 on Reply Card

NEW PRODUCTS

(Begins on page 148)

ternal wiring and provides space for integral mounting of a photoelectric control cell. General Electric Co.

25—STEEL STOOLS with adjustable wood seats

Most important feature of these steel stools is tubular welded construction of the bases for strength rigidity and durability. Part of company's Hallowell line the new units are designed for shops, shop offices, drafting rooms etc. Seats on all six models are re-

volving type with 4-in., screw adjustment of height. Two seat styles are available: a round, dished, hardwood seat, 14½ in. in diameter, and a five-plywood seat, 16 in. wide by 14¾ in. leep, contour shaped for greater comfort. Those with the round seat come with or without plywood posture backs mounted on adjustable spring steel supports. These backs are standard on stools with the shaped plywood seats. There are three adjustable height ranges: 17 to 21 in., 22 to 26 in., and 27 to 31 in. The latter two had a tubular steel footrest. Glides are standard, but rubber swivel casters are available also. Standard Pressed Steel Co.

26—FOUR-WAY VALVES are solenoid controlled

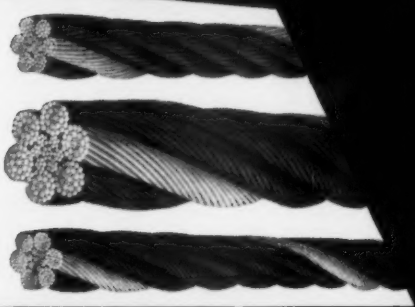
This line of pilot-operated, solenoid controlled four-way valves are announced as meeting JIC requirements and designed to provide all porting and positioning arrangements on circuits up to 3000 psi. They are described as shorter in overall length than comparable valves and as having rugged drawn-steel solenoid covers and short solenoid power stroke. Their design involves use of internal retaining cords to secure covers to valve body. A choice of spool types and spool positioning provides combinations needed for a wide range of applications. Adjustable pilot chokes for smooth spool

You're buying a service... when you buy Macwhyte Wire Rope!

WIRE ROPE

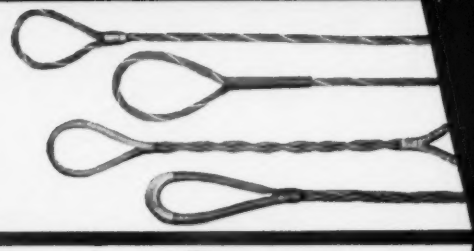
You can get the **right** rope no matter what your equipment need . . . when you buy from our thousand-and-one types, sizes, and grades of wire rope.

Monarch Whyte Strand wire rope is available PREformed and Internally Lubricated, in Lang Lay, Regular Lay, and with Independent Wire Rope Core or Fiber Core. Ropes are made of Bright Steel, Galvanized Steel, Stainless Steel, Monel Metal and Plastic Coated. They are supplied properly lubricated and fabricated to serve well under the severest service conditions. Ask for Monarch Whyte Strand Bulletin 5425.



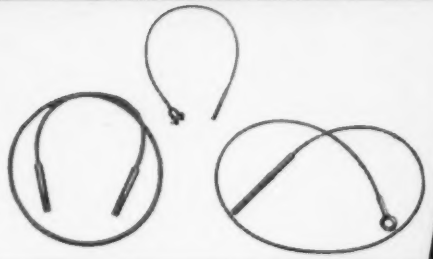
SLINGS

Hundreds of sizes and types of Macwhyte wire rope slings are designed with the lightness, flexibility, and handling ease you need for efficient, low-cost material handling. Three body styles are made: ATLAS Round-Braided, DREW Flat-Braided, MONARCH Single-Part. Ask for your free copy of Sling Data Bulletin 5308-R.



WIRE ROPE ASSEMBLIES

Safe-Lock wire rope assemblies are made in a wide range of sizes for machine parts, controls, and operating devices. They are prefabricated to the exact size and length you need—ready-to-use for safe, easy, quick, low-cost installation. Ask for Bulletin 57126.



When you buy Macwhyte products in any form —

Wire Rope, Slings, or Cable Assemblies — you're buying a piece of our organization. Our wire rope engineers are as near as your phone, ready to advise and make recommendations — for free! — on *all* your wire rope needs. If your problem is unique, our engineers will specify a rope or assembly to meet your particular requirements safely, economically, and correctly. Don't guess about wire rope. Call on Macwhyte . . . you'll be glad you did!

107

Have you seen our film on wire rope, "Life-Line"? It's available on a loan basis to groups. Ask for Bulletin.

MACWHYTE Wire Rope COMPANY

MACWHYTE WIRE ROPE COMPANY, 2991 Fourteenth Avenue, Kenosha, Wisconsin
Manufacturers of Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal, Stainless Steel, Plastic Coated and Nylon Coated Wire Rope, and Wire Rope Assemblies. Special catalogs available.

MILL DEPOTS: **New York 4,** 35 Water St. • **Pittsburgh 30,** P. O. Box 10916, 353 Curry Hollow Road • **Detroit 3,** 75 Oakman Blvd. • **Chicago 6,** 228 S. Desplaines St. • **St. Paul 14,** 2356 Hampden Ave. • **Ft. Worth 1,** P. O. Box 605 • **Portland 9,** 1603 N. W. 14th Ave. • **Seattle 4,** 87 Holgate St. **San Francisco 7,** 188 King St. • **Los Angeles 21,** 2035 Sacramento St.

For more facts circle 594 on Reply Card

"There's one of our most profitable investments for employee comfort and efficiency . . . a well-ventilated plant"

"We've learned that adequate ventilation has a definite bearing on the efficiency of our employees. It's as important as correct lighting, safety devices and cleanliness in allowing them to do their work without annoying discomfort."

Swartwout Ventilation gives workers new speed and accuracy — helps lower production costs. They make fewer mistakes — have fewer accidents. Removal of excess heat, vapors and smoke is accomplished economically — rain or shine, windy or calm.

It pays you to study the amount of air contamination in your workrooms; to survey the possibilities of roof ventilation relief. Swartwout ventilation engineers will gladly recommend the type of installation that gives maximum efficiency, based on Swartwout's 53 years of experience in supplying industrial ventilation . . . Representatives in all principal cities.

The Swartwout Co.
Ventilation Engineering
18572 Euclid Avenue Cleveland 12, Ohio

For more facts circle 595 on Reply Card

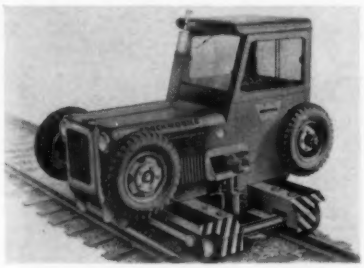
NEW PRODUCTS

(Begins on page 148)

reversal are optional. Capacities are 30 gpm and 5 gpm for the ¾ pilot and ¼-in. solenoid valves. These valves are interchangeable with comparable valves now in use, and at lower cost. Details are in Bulletins VD-7 and VD-8. Denison Engineering Div., American Brake Shoe Co.

27—CAR MOVER has greater operating efficiency

Besides incorporating all features found in company's previous models, the Torque Converter Trackmobile is equipped with an all-new power train which includes a new engine and a torque converter-hydraulic transmission combination. The rugged, six-

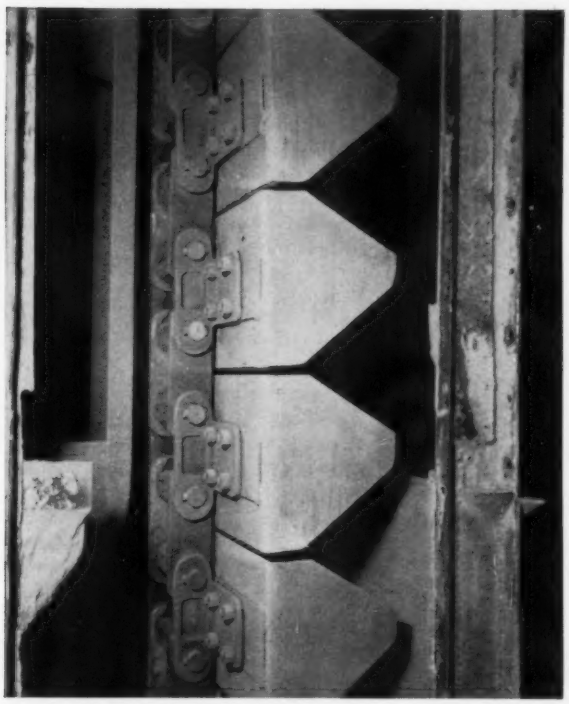


cylinder engine enables the unit to develop 13,000 lb of drawbar pull, claimed ample for moving several fully loaded freight cars. According to manufacturer, the torque converter offers the advantages of multiplied and smooth application of power. The hydraulic transmission offers simplified gear ratio changes. Combined, they: eliminate clutch manipulation and conventional gear shifting, thus simplifying operation; afford more exact control of the Trackmobile's movements, eliminate need for clutch slippage under load, and simplify "inching"; multiply engine torque to fit load requirements, providing maximum power to the wheels; and provide an oil cushion to protect the Trackmobile from effects of shock loading. An important feature of the Trackmobile is the double set of wheels—one for the road, one for the rails—which let the unit travel anywhere. Whiting Corp.

28—FLOOR ENAMEL for the heavy traffic areas

Granitite is announced as a chemical resistant enamel for use on volume-traffic wood and concrete floors. It contains a synthetic resin base reputed to withstand scuffing, pounding and abrasive action of heaviest foot traffic. It is also claimed to prevent dusting

This Link-Belt SS chain has carried over one million tons annually for 16 years



LINK-BELT SS-1146 BUSHED CHAIN on elevator at Whitehall Cement Mfg. Co. measures 20⅞ in. wide. This original chain has been in use since 1941 and, considering the rugged conditions, has needed amazingly few replacements of pins, bushings or links.

Installed on elevators handling cement clinker 24 hours a day

The remarkable performance of Link-Belt SS-1146 bushed chain at Whitehall Cement Mfg. Co., Cementon, Pa., testifies to its exceptional strength and wear resistance . . . emphasizes the economy of choosing the right chain for a specific job. Since 1941, each of three elevators has handled approximately 17 million tons of highly abrasive cement clinker.

Repeated success

This outstanding record of continuous chain service under the toughest conditions is by no means a rare case. Numerous installations report similar results achieved with this long-life wear-resistant chain.

Link-Belt SS-1146 bushed chain offers large joint bearing surfaces for greater wear resistance and trouble-free service in heavy-duty conveying and elevating. Sidebars of selected steel are accurately formed and machined for tight press fit of pins and bushings. The latter are made from tough, hardened steel and locked against rotation in sidebars.

For abrasive jobs

These straight steel sidebars with hardened steel pins and bushings provide needed strength to resist heavy continuous loads. Smooth, hardened surfaces resist abrasive action of gritty materials, prevent packing in critical joints.

18 million tons, 26 years later... SS-856 chain still serviceable

Sets record in cement mill elevator service

The more than quarter-century of continuous handling of raw materials at a cement mill illustrates the long-wearing durability of Link-Belt SS-856 elevator chain. This amazing service record under extremely tough conditions proves that it pays to pick the right chain from Link-Belt's complete line.

Link-Belt SS-856 chain is made of high carbon steel sidebars with nickel alloy pins and bushings. Hardened sidebars give additional strength plus greater resistance to wear and pitch hole distortion. In addition, accurately machined pitch holes assure proper pitch and tight press fit of mating parts —extend chain life. The hard, smooth surfaces of steel joints repel gritty materials . . . resist abrasion.

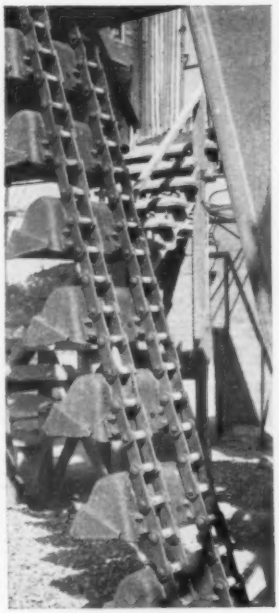
Link-Belt elevator chains are available with ultimate strengths up to 200,000 lbs.

Link-Belt SS-102½ bushed chain extends life of stone elevator

Several years ago an eastern stone quarry installed a main bucket elevator to handle 200 tons per hour of minus 2¼-in. mixed stone. Service life of the original two-strand elevator chain was found inadequate. After several shutdowns, it was replaced with Link-Belt SS-102½ chain with K-5 attachments at every third link.

This long-life, wear-resistant chain is now in its fourth year of uninterrupted operation. It has carried close to 350,000 tons as compared to 60,000 tons which was considered normal life for the previous chain.

Recent inspection of the SS-102½ chain reveals that it is good for another long stretch of service. Elimination of shutdowns and replacements more than justified the slight difference in cost between this and the original chain.



STONE ELEVATOR has buckets at every third link. Centers are 65 feet, with elevator inclined 75 degrees from the grade. Chain speed is 280 feet per minute.

HEADQUARTERS for chains, sprockets and other Link-Belt products is your nearby Link-Belt office or authorized stock-carrying distributor. Refer to the yellow pages of your local telephone directory.

LINK-BELT

CHAINS AND SPROCKETS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville N.S.W.; South Africa, Springs. Representatives Throughout the World. 14.735

For more facts circle 596 on Reply Card

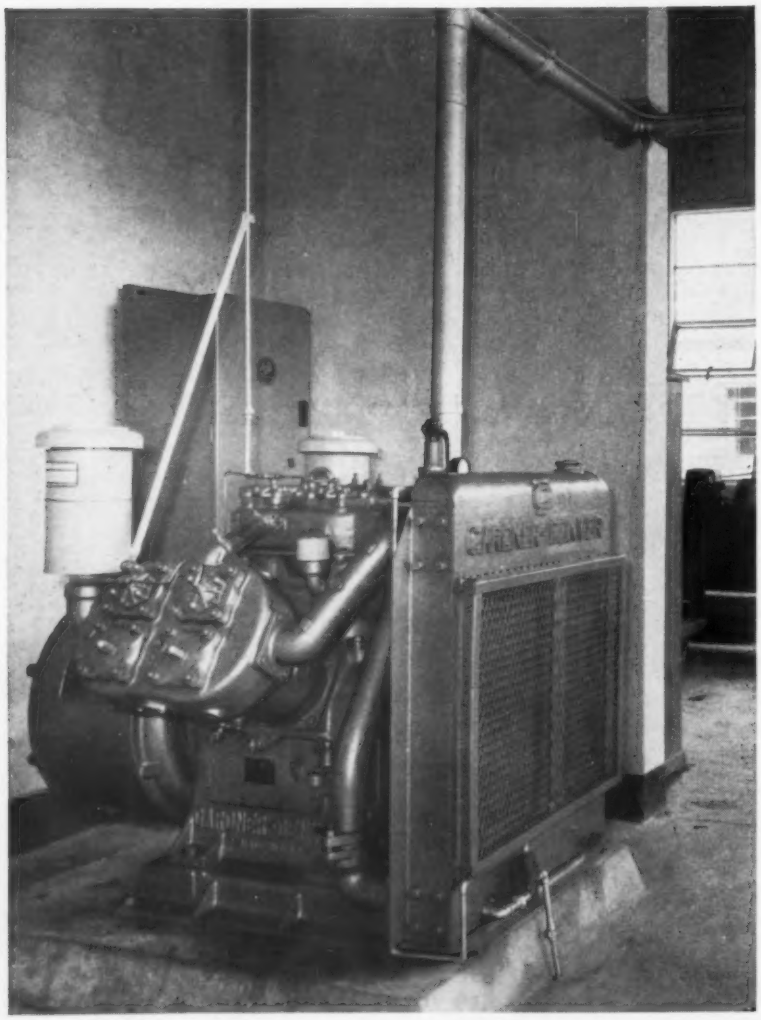
GARDNER DENVER

Compact and efficient, the Gardner-Denver WB supplies low-cost compressed air power from a small corner of your plant. The "W" design saves floor space. Balanced high- and low-pressure cylinders eliminate vibration and the need for expensive foundation. Pump circulates cooling water around cylinders and separate valve chambers. That's the story of WB quality. Want details? Send for Bulletin WB-10.

Stationary air compressors . . . tank-mounted compressor outfits . . . oil-free air compressors . . . whatever your compressed air needs, see your Gardner-Denver compressor specialist first. Gardner-Denver Company, Quincy, Illinois.

Compact . . . efficient

WB Two-Stage Compressor



For more facts circle 597 on Reply Card

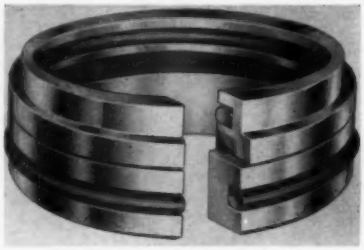
NEW PRODUCTS

(Begins on page 148)

of concrete floors and dirt accumulation in porous wood floors. According to manufacturer, Granitite is unaffected by repeated scrubbings with strong caustic cleansers and heavy-duty floor cleaning machines, and it resists destructive action of oils, greases, solvents and mild industrial acids. Spilled liquids do not penetrate its surface. Because of its unusual chemical resistance, Granitite is reported ideal for locker rooms and wash rooms. Applied by brush, roller or spray, it comes in four colors and white. It dries to a hard finish overnight. Form A-521 gives details on Granitite. The Garland Co.

29—MECHANICAL SEAL uses magnetic force for sealing

This simple seal has just two working parts held together by magnetic force. This force retains an even pressure on the optically flat sealing surfaces regardless of operational pressures, says manufacturer, and a seal is formed



between self-lubricating carbon and Alnico metal lapped faces so tight that helium gas cannot leak through. The magnetic seals can be used to replace many conventional packings or mechanical seals in pumps, compressors or on rotary shafts where liquids, gasses or corrosives are to be sealed. Because of their compactness, they are claimed to fit any stuffing box, and are readily installed on any smooth shaft without use of set-screws. A. W. Chesterton Co.

30—TAPE TRANSPORT for telemetry applications

With this precision tape transport for telemetry applications and other analog data acquisition systems, data can be recorded separately or in combination by direct-recording frequency modulation or pulse-width modulation. Transport is equipped to handle up to 14 in. reels as standard, accommodating tape widths of ¼ in. to 2 in. Six tape speeds—from 60 to 1⅞ ips—are available by selective switching. A two-

speed version is also available, with either 60-and-30, 60-and-15, or 30-and-15 ips. Other features include a search and control capstan at 120 ips, that permits selection of descriptive data at any point on tape; precision servo-type tape tension control, and sensing arms that automatically stop tape before end of reel without use of special stops. Transport is mounted on a drawer-type chassis which pulls out to expose subassemblies. Minneapolis-Honeywell Regulator Co.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 217-218.

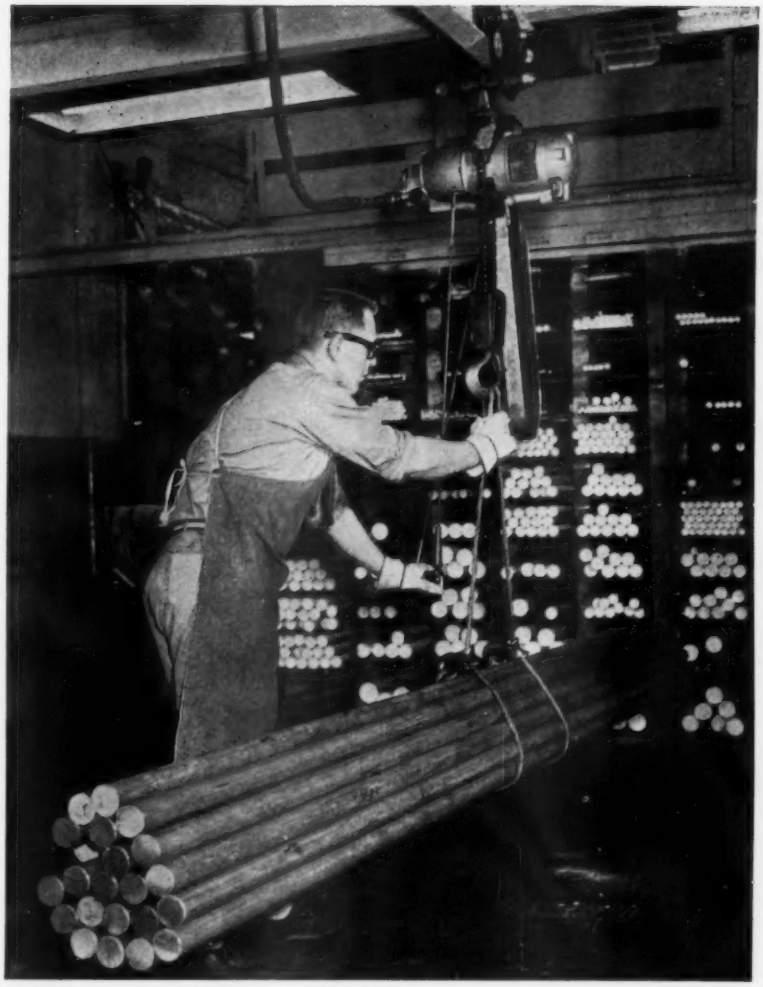
31—CHAIN is embossed for lifetime identification

Make and grade marks are now embossed onto the links of four grades of this company's chain. The two marks appear alternately at 10-in. intervals along the chain opposite the weld and on only one side of the link. This permanent branding is available on "Inswell" Proof Coil, BBB, High Test, and Herc-Alloy Chain in all sizes under ½ in. "Inswell" Chain is also color marked at 5-ft intervals for quick identification and measuring. Columbus McKinnon Chain Corp.

32—ULTRASONIC UNIT washes and rinses clean

Model H-50 Sonogen is a self-contained ultrasonic installation for cleaning, immersion or spray rinsing and is designed to clean badly soiled industrial parts in a few minutes, with minimum operator attention. The stainless steel unit measures 27 by 36 in. and 42 in. high, with a counter top area of 21 by 36 in. Wash and rinse tanks are usually arranged for left to right work flow, although reverse work flow is available. Installation requires only connection to hot and cold water, drains and a 110-v, 60 cycle current source.

The cleaner can be used for removing carbon, grease, chips and insoluble soils from intricate parts. Oil, lapping compound, rouge and cutting fluids have been removed even from sintered metal, says manufacturer, and often assembled units may be cleaned without dismantling, simply by dipping the entire unit in the ultrasonic bath. The Model H-50 generates powerful pulses of electrical energy at 40,000 cycles per second, which are converted by a transducer into mechanical vibrations of the same ultrasonic frequency. Attached to the bottom of the tank,



Lift and load in a jiffy

with this handy, powerful air hoist

This Keller Tool two-ton air hoist has just unloaded bar stock from a truck at the loading dock. Now, it quickly transports the material to storage bins. Keller Tool air hoists solve many such hoisting, loading, unloading and moving problems easily and safely.

Positive starting under full load and variable-speed lifting and lowering help the operator complete the entire job in a jiffy. One hand controls the hoist; the other controls the load. Powerful brake holds load regardless of air supply. Secondary safety cable provision further protects operator and load.

Gardner-Denver's line of Keller Tool air hoists is available in lifting capacities of 150, 300, 500, 2000 and 4000 pounds. Request Bulletin 86.

ENGINEERING FORESIGHT—PROVED ON THE JOB
IN GENERAL INDUSTRY, CONSTRUCTION, PETROLEUM AND MINING

GARDNER DENVER

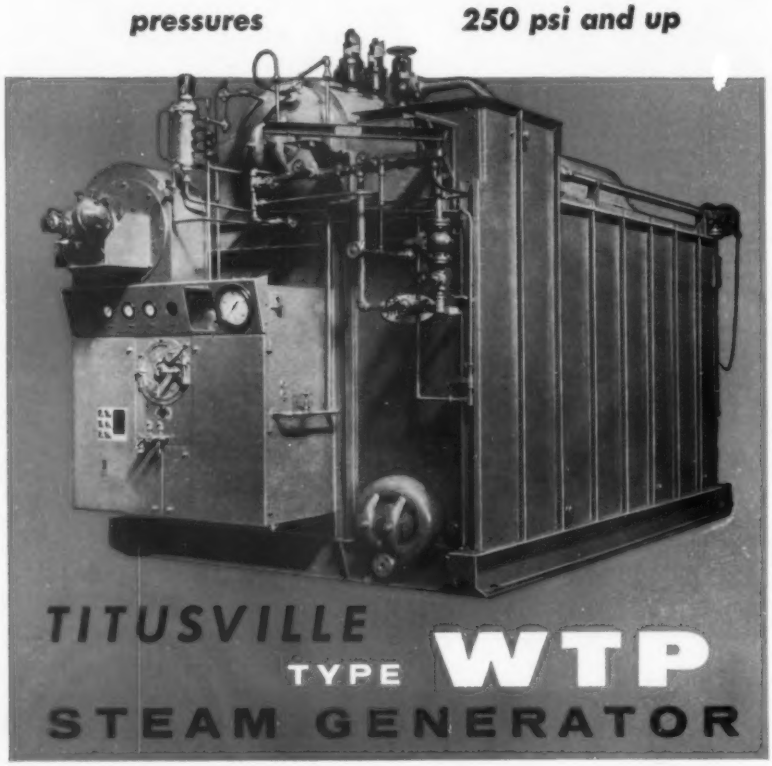
Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

For more facts circle 598 on Reply Card

PERFORMANCE

Meeting Your Most Rigid Requirements—in Capacities to 60,000 lbs.

pressures 250 psi and up



TITUSVILLE TYPE WTP STEAM GENERATOR

Tops in steam generating performance is matched by outstanding dependability in Titusville's Type WTP Water Tube Steam Generators. Completely factory-assembled, ready to ship by flatcar or truck trailer, Type WTP is easy to install in your boiler-room. • Let us show you why and where Type WTP is serving many of the toughest boiler assignments in the country. When writing, ask for Bulletin 5511.

THE TITUSVILLE IRON WORKS CO.

BOILER DIVISION
BOILERS for Power and Heat . . . High and Low Pressure . . . Water Tube . . . Fire Tube . . . Package Units

PROCESSING EQUIPMENT DIVISION
Crystallizers . . . Direct Fired Heaters . . . Evaporators . . . Heat Exchangers . . . Mixing and Blending Units . . . Quick Opening Doors . . . Special Carbon and Alloy Processing Vessels . . . Synthesis Converters

FORGE DIVISION
Crankshafts . . . Pressure Vessels . . . Hydraulic Cylinders . . . Shafting . . . Straightening and Back-up Rolls

A Division of

Struthers Wells

TITUSVILLE, PENNSYLVANIA

Manufacturers of A Complete Line of Boilers for Every Heating and Power Requirement

Plants at Titusville, Pa. and Warren, Pa.

Offices in Principal Cities

For more facts circle 599 on Reply Card

NEW PRODUCTS

(Begins on page 148)

the transducer sends its energy through the detergent or other cleaner, and the ultrasonically agitated liquid loosens and removes contaminants. Branson Ultrasonic Corp.

33—INSULATING CEMENT provides greater coverage

Improved Super Powerhouse Cement is a white insulating-finishing cement said to provide 30 per cent more dry coverage with virtually no shrinkage. Field tests are reported to show that 100 lb of it will cover an area 72 sq ft, ½ in. thick. Also, this new quick-setting cement is said to dry even whiter than its predecessor and give a

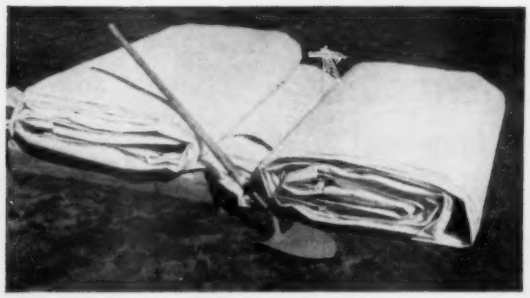
harder finish with reduced density. According to company these improvements have been attained at no sacrifice of qualities of the former product and with no increase in cost.

The cement both insulates and finishes in a single coat whether applied directly to such irregular hot surfaces as valves and fittings or over other insulations. Gray when applied, it dries to a glazed white surface when finish trowelled. Due to its negligible shrinkage, it is reported particularly suitable for use on large areas. The cement remains workable for 1 hr and sets to initial hardness within 3 hr. Manufacturer says it will withstand drenching rain after taking its initial set and can be painted, if desired, while wet or dry. Baldwin-Hill Co.

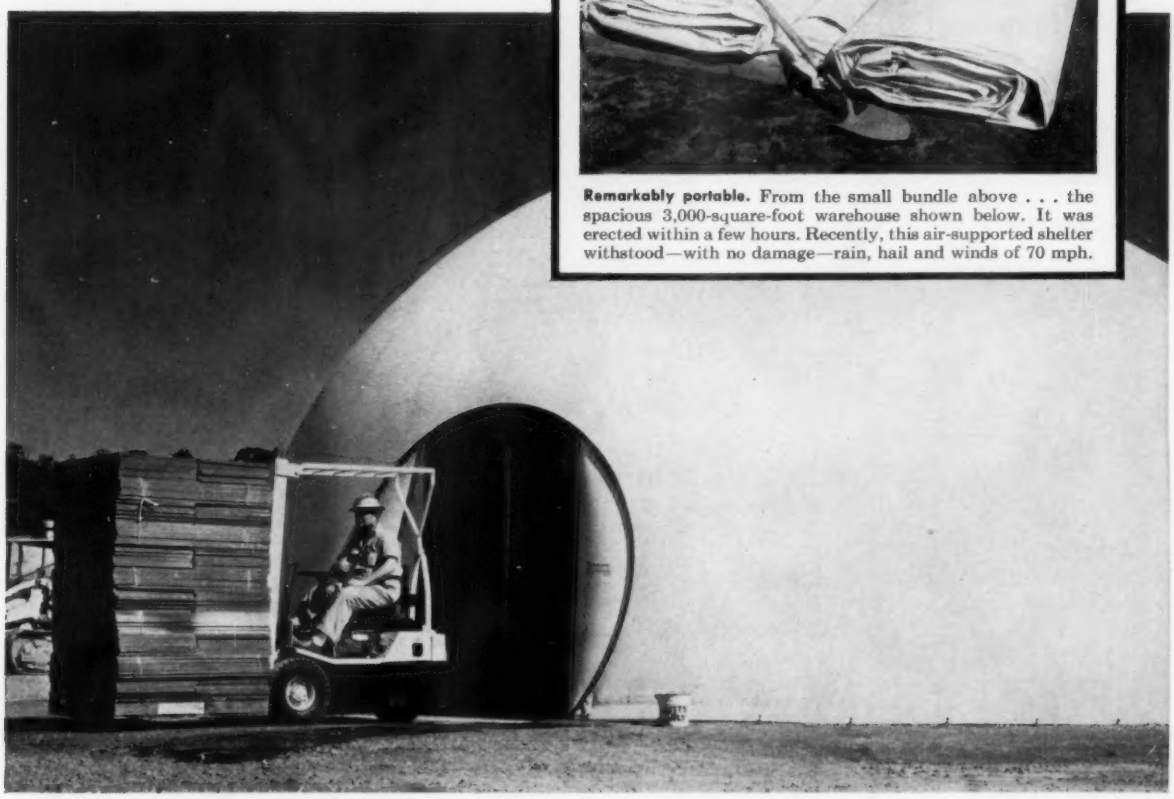
34—ELECTRONIC DEVICE protects instrumentation

Form 101 is a circuit protective device having high interrupting capacity and becoming current limiting at about four times its normal current rating, company announces. It is designed to anticipate and prevent rise of fault currents to high destructive maximums. The electronic Amp-trap is available in capacities and sizes for use in 65-130 and 250-v circuits in rectifier, electronic and power applications. It is for protection of germanium and silicon diodes of small sizes as well

NEW performance for versatile "Fairprene"



Remarkably portable. From the small bundle above . . . the spacious 3,000-square-foot warehouse shown below. It was erected within a few hours. Recently, this air-supported shelter withstood—with no damage—rain, hail and winds of 70 mph.



Portable and reusable, air-supported shelters of "Fairprene"® fabric provide low-cost, temporary buildings for many uses

Air-supported shelters made with Du Pont "Fairprene"* synthetic rubber coated nylon can provide low-cost temporary buildings for warehousing, protection for process equipment and a covering over construction sites. These shelters offer three big advantages: quick erection, easy portability and economy. For example: compared with a wood-pole building 40 x 80 feet, the air-supported shelter of comparable size will have approximately the same first cost, including site preparation and erection. The savings occur when it is necessary to move the structure. After dismantling and re-erecting both types of shelters, you will find the total cost of both erections, the initial and second, to be about $4,000 less for the pneumatic shelter, according to a study conducted by Du Pont Engineering Department.

Extra-rugged Du Pont "Fairprene" coated fabric assures longer-lasting service for air-supported shelters. "Fairprene" is a high-strength coated nylon fabric that resists tearing and punctures. For protection against outdoor conditions, the nylon base is coated on both sides with Du Pont "Hypalon"** synthetic rubber. "Hypalon" offers the *best* sun and weathering resistance of any coating now on the market . . . stays flexible, even at temperatures as low as 65 degrees *below zero* . . . is translucent, permits natural daylighting

For more information about these air-supported shelters and versatile Du Pont "Fairprene" coated fabrics, just mail the coupon.

*"**FAIRPRENE**" *is Du Pont's reg. trademark for its coated fabrics, sheet stocks and cements.*

"HYPALON**" *is Du Pont's registered trademark for one of its synthetic rubbers.*

DU PONT INDUSTRIAL COATED FABRICS SHEET STOCKS • CEMENTS

DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

E. I. du Pont de Nemours & Co. (Inc.)
Fabrics Division, Dept. PE-84, Wilmington 98, Del.

Please send me your fact-filled booklet, "Pneumatic Shelters," that tells all about these new inflatable structures and about Du Pont "Fairprene" coated fabrics.

Name_____ Position_____

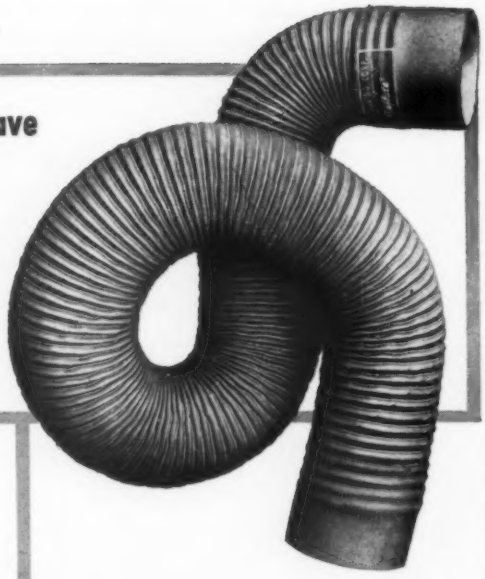
Company _____

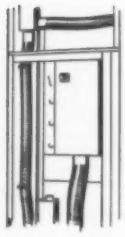
Address_____

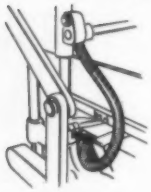
City_____ Zone_____ State_____

For more facts circle 600 on Reply Card

FLEXFLYTE can save you time and money in any of these operations







DUST COLLECTION—Here Flexflyte is used as the connector duct from the abrasive wheel to the dust collector on a tire buffing and truing machine.

AIR HANDLING—Cooling electronic tubes in television transmitters is a good example of the uses to which Flexflyte can be put.

FUME REMOVAL—In this type-casting operation Flexflyte is used to exhaust the heat, smoke and oil fumes given off by molten lead.

MATERIALS HANDLING—Flexflyte is used in the circulating system of this gluing machine because it takes up little space and is strong.

Flexflyte is one of a complete line of ductings for industrial applications. Extremely flexible, this rugged fabric ducting installs in no time at all and requires little maintenance. It cuts quickly to required sizes from stock lengths. No special elbows or fittings are needed to make it complete tricky turns around corners. And its smooth integrated bends provide an unobstructed flow of whatever is being conveyed. Though light in weight, Flexflyte has high tensile strength and excellent resistance to abrasion and chemicals. It will not support combustion.

If you have a ducting problem, Flexflyte® could well be your answer. Just say the word and we'll have one of our field engineers stop by and talk things over. Their background and experience is always at your service. For full information, write Dept. 94.

Stocked by leading industrial distributors throughout United States and Canada

Flexible Tubing

CORPORATION

GUILFORD, CONNECTICUT

ANAHEIM, CALIFORNIA HILLSIDE, ILLINOIS

For more facts circle 601 on Reply Card

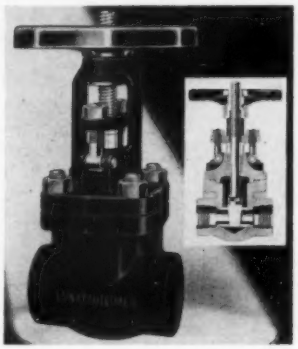
NEW PRODUCTS

(Begins on page 148)

as oscillograph circuits and delicate instrumentation. Because of its high interrupting capacity and current limiting action it can be connected directly into circuits where available current is high, it is noted, up to 100,000 amp symmetrical. Depending on its rating, the unit will continuously carry from one to 10,000 amp of normal current, manufacturer states, limiting on overload but blowing instantly on short circuit. The Chase-Shawmut Co.

35—GATE VALVES, of forged steel, compact design

These forged steel gate valves are compactly built for easy installation in cramped quarters. Featuring the bolted bonnet design, with outside-

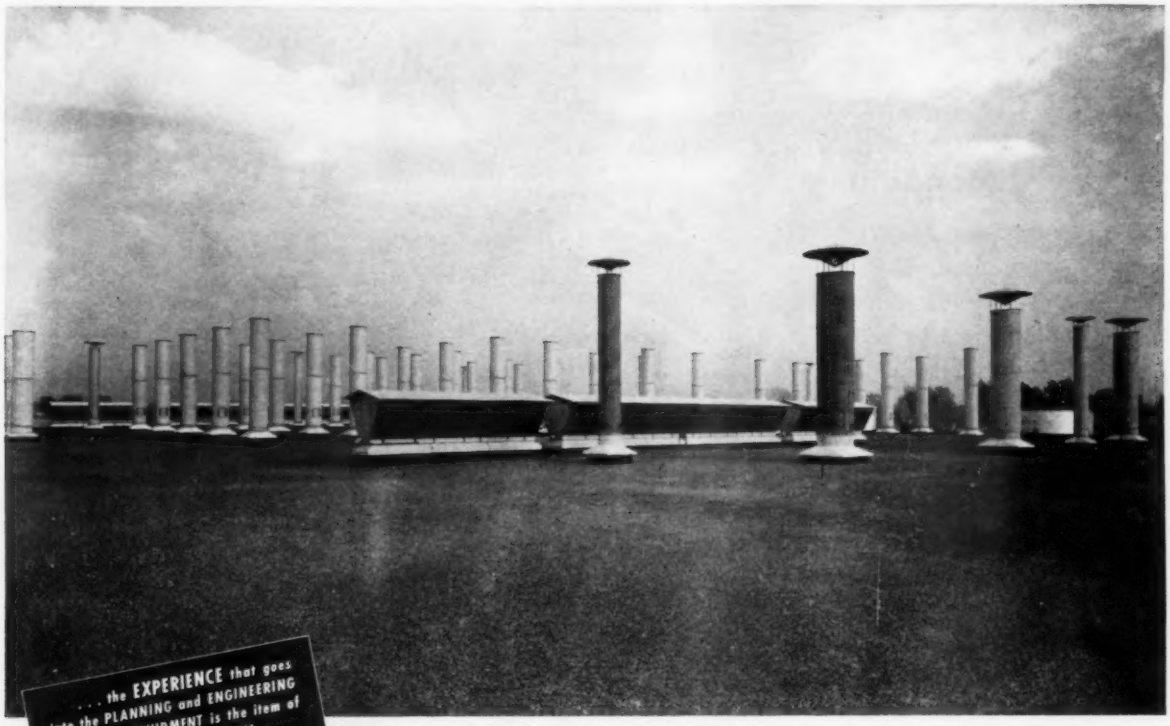


screw rising stem, solid-wedge disc and rolled-in seat rings, the valves are available with screwed or socket welding ends in ½- through 2-in. sizes. The valves are rated 800 lb at 850 F, and 2000 lb at 100 F. The Lunkenheimer Co.

36—AIR-POWERED PUMP for dispensing paint thinners

The Graco Air-Powered Pump is specifically designed to safely pump paint thinners, solvents and similar fluids direct-from-original drums to point of use. With this 1-1 ratio pump, drums of thinners or solvents may be located outside or in separate, fireproof room, company states. Pump is mounted on wall inside building for easy access and protection. Suction tube is inserted in drum bung to remove fluid—quickly transferred from empty to full drum. Plastic impregnated leather packings and solvent resistant fluid supply hose in this pump make it suitable for supplying multiple thinner outlets in paint mix room. Pump may also be used for supplying solvents to parts washing benches. Being air powered,

FINISHING SYSTEMS . . .



Air Intakes and Exhaust Stacks of Bonderizing Equipment, Spray Booths and Ovens of a Complete Mahon Finishing System Installed in the Lincoln-Mercury Plant, Wayne, Mich.

In the initial construction of the Lincoln-Mercury Plant at Wayne, Michigan, the Building Products Division of the Mahon Company supplied and erected the Steel Roof Deck, and the Insulated Aluminum Curtain Walls for the entire Plant, Powerhouse and Paint Storage Building.

Since this installation was completed in 1952, the Mahon Company has installed Six more similar installations for the Ford Motor Company in new plants across the country.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

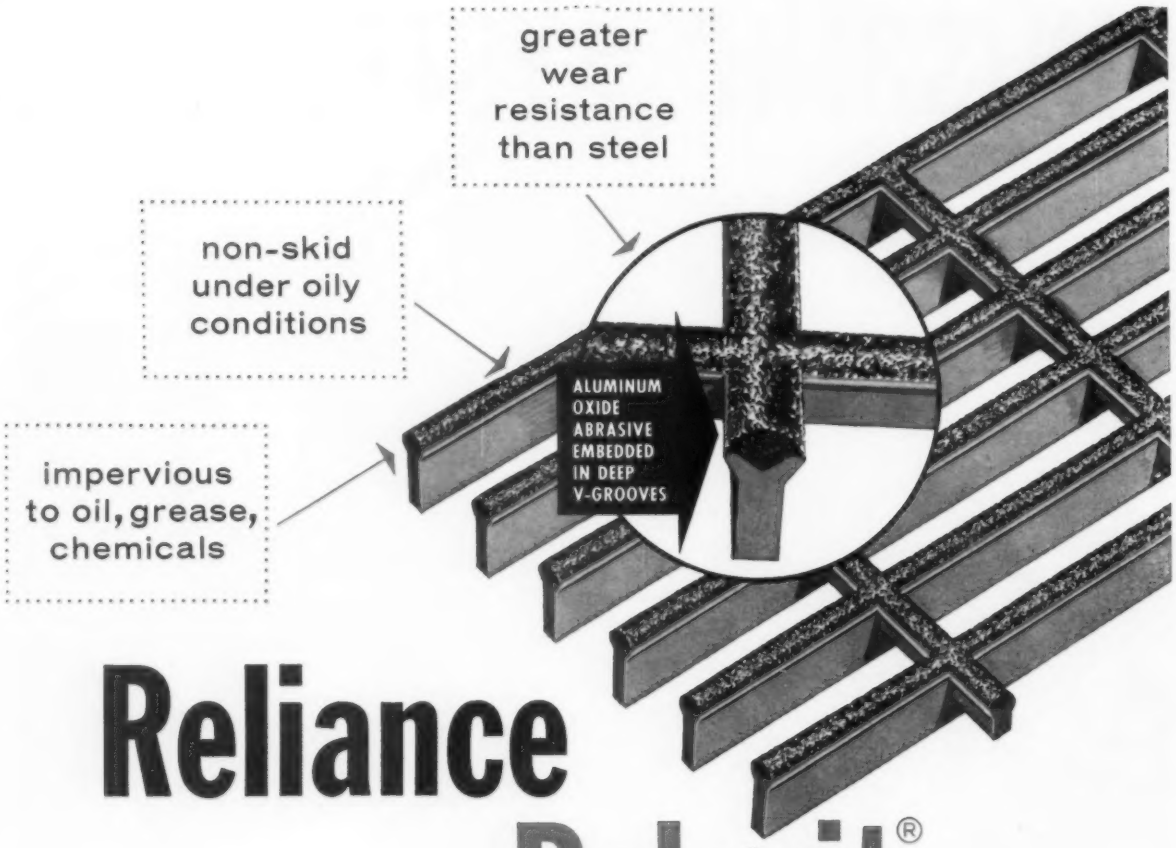
SALES-ENGINEERING OFFICES in DETROIT, NEW YORK and CHICAGO

Engineers and Manufacturers of Complete Conveyorized Finishing Systems; Metal Parts Washers, Metal Cleaning and Rust Proofing Machines, Conveyorized Cleaning and Pickling Machines; Dry-Off Ovens, Cooling Tunnels, Spray Booths, Electrostatic Spray Enclosures, Flow Coaters, Dip Coaters, and Finish Baking Ovens; Core Ovens, Heat Treating and Quenching Equipment for Aluminum and Magnesium, Dust and Fume Control Installations, and Many Other Units of Special Plant and Production Processing Equipment.

See Sweet's Plant Engineering File for Information and Representative Installations, or Write for Catalogue A-658

MAHON

For more facts circle 602 on Reply Card


greater wear resistance than steel
non-skid under oily conditions
impervious to oil, grease, chemicals
ALUMINUM OXIDE ABRASIVE EMBEDDED IN DEEP V-GROOVES

Reliance Relgrit®

abrasive embedded grating

Reliance Relgrit abrasive embedded grating and treads provide the only truly non-skid surface. Even when covered with oil, Relgrit has a coefficient of friction 30% greater than dry steel grating. Wear tests have shown that the abrasive surface will wear longer than steel, and retain its non-skid quality during its entire service life.

The top surfaces of the bearing and cross bars have ⅛"-deep V-grooves in which are embedded abrasive aluminum oxide grains in a hard resin. The material is not affected by water, oil, gasoline, greases, or commonly used acids, alkalis and other chemicals. Together with its wear resistance, this gives Relgrit a long service life.

If you have floors or stairs which become oily, greasy, wet, or slick from any cause, Relgrit can provide safe footing at very low cost. It is available in all standard spacings and in U-Type; special spacings on request. Write on your letterhead for free sample and literature, or ask for our representative to call.

*you can't slip on Relgrit**

*Patent applied for

Please send Bulletin R655B describing Relgrit abrasive embedded grating and treads.

NAME

COMPANY

ADDRESS

CITY STATE

RELIANCE
Steel Products Company
P.O. Box 510-P, McKeesport (Pittsburgh District), Pa.

Relgrit Abrasive Gratings and Treads • Lightweight Bridge Flooring
Steel, Stainless and Aluminum Grating • Steel Mill Equipment

For more facts circle 603 on Reply Card

(Begins on page 148)

pump is spark free, cannot burn out, automatically starts and stops when operator opens or closes spigot or valve at point of dispensing, company points out, regardless of its distance from pump. Gray Co., Inc.

37—LOADING DOCK RAMP operates automatically

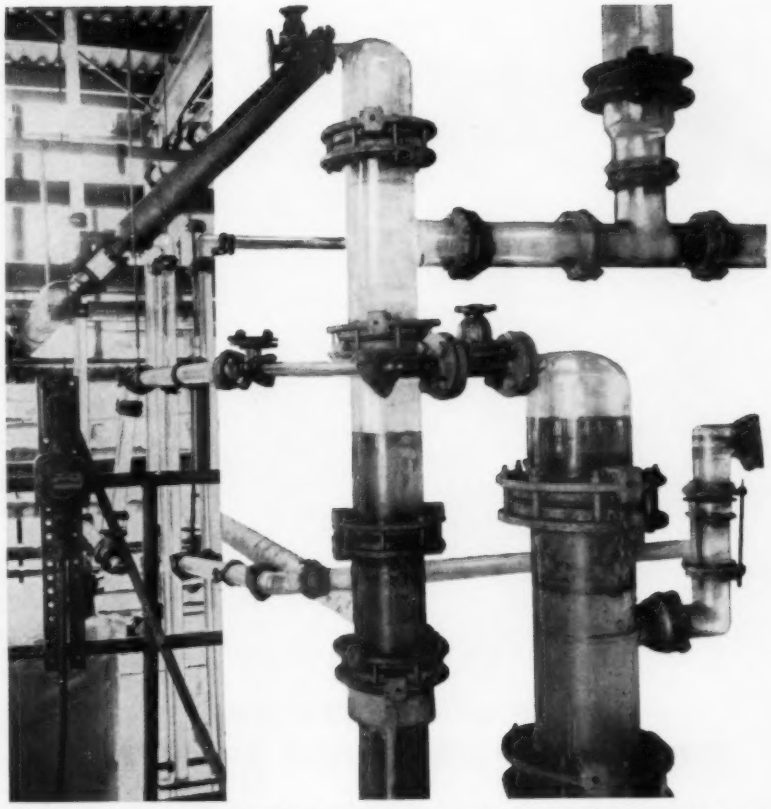
Controlled tension spring assembly is a feature announced for this automatic dock ramp which, is pointed out, requires no counterweights. In operation of ramp mechanism, the spring assembly counterbalances the weight of the platform to provide smooth movement with no "jump." The ramp is operated by backing a truck unto the rugged bumper assembly. This actuates

the mechanism and the platform slowly rises—a "moment of dwell"—then descends, resting on the truck bed, and providing clear passage from dock to truck for loads to 20,000 lb. "Floating action" permits platform to remain on the truck bed as truck heights change with load transfer. When the truck pulls away from the ramp bumper, the platform automatically rises, then settles at dock level with bumper extended ready for the next truck.

Although the platform rests on truck beds above or below dock level, two safety-leg supports hold the platform at horizontal level when trucks are not at the dock—permitting full use of platform for dock space. Another feature announced for the ramp is ability to automatically correct for "out of square" trucks. If a truck backs into the dock at an angle, the bumper arms automatically line up with the truck, it is explained. This side-to-side swiveling action relieves strain on the moving ramp mechanism and permits straight line travel of actuating arm. Rotary Lift Co.

38—HANGER permits floor servicing of luminaires

The Triplex is a disconnecting and lowering hanger for use with high-bay fluorescent, mercury and incandescent luminaires or clusters weighing from



More than 2000 feet of PYREX Pipe carry chlorinated acids and organics for the Velsicol Chemical Corporation. Complicated arrangements such as this can be completed in less than half the time ordinarily taken to install metal piping.

Why even chlorinated compounds do not corrode this pipe

Pump boiling HCl through PYREX brand Pipe *for 200 years* and you'd still find the pipe intact, still trustworthy, still strong, still transparent.

This single fact was enough to convince the engineers at Velsicol Chemical Corporation's Memphis Tennessee plant that PYREX piping is ideal for their chlorinated acids and organics.

It's also a fact that of all the thousands of corrosive chemicals you might pump through PYREX Pipe only hydrofluoric acid and hot alkalies would have any appreciable corrosive effects on the pipe.

Blocks side reactions. No metal traces can enter your process from PYREX Pipe and the glass itself can never act as a catalyst, so you never get contaminating side reactions.

Makes processing *visible*. Transparency is a terrific advantage in piping.

You can *see* the condition of your product and process at all times.

Your maintenance crew saves time with visual inspections, too. Because of its smooth glass surface, PYREX Pipe seldom allows scale or sludge build-up. But should this occur or should something block this pipe, your men can locate the trouble exactly and determine its nature without tearing out the entire pipeline.

New bulletin now out. The new PYREX Pipe bulletin tells you something of the long history of this pipe in chemical processing, examines its many advantages over conventional piping, lists sizes and fittings, and offers information on installation. Send the coupon for a copy.

Corning means research in Glass

CORNING GLASS WORKS

10-4 Crystal Street, Corning, New York

Please send a copy of your **NEW PYREX Pipe Bulletin.**

Name.....

Title.....

Company.....

Street.....

City..... Zone..... State.....

For more facts circle 604 on Reply Card

Designed with the Look of Tomorrow by Raymond Loewy Associates

NEW PARTLOW MFS TEMPERATURE CONTROL

New Looks, Convenience, Efficiency for Your Process Equipment

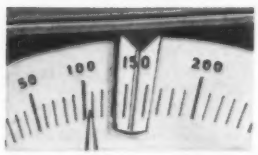
Striking as they are, good looks are only part of the story of Partlow's spectacular new control. Inside and out, the MFS is as rugged and efficient as a temperature control can be, its tough mercury-actuated element having been built to retain sensitivity and accuracy even under extreme conditions. Convenient, too! You can interchange the mercury element right out in the field . . . no factory adjustment is required.

The MFS comes in 10 scale ranges. Accurate within ½ of 1% of scale range, it is especially adaptable to control applications where temperature variations must be kept at a minimum; or where sudden temperature changes demand instant response.

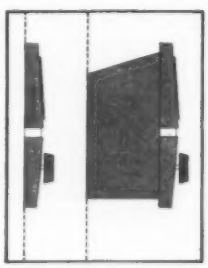
If your product or process requires close, positive temperature control within the –30° F. to 1100° F. range, you are invited to test this advanced new instrument soon. Write, wire or phone today.

THE PARTLOW CORP.
DEPT. PE-458, NEW HARTFORD, N. Y.

Only in the Partlow MFS so many important innovations:



Accu-Vision Dial — Magnified pointer for closest settings. Dial calibrations, pointers and background scientifically color-contrasted for easy readability — even at a distance.



Flush or Wall Mounting — No additional brackets or hardware are required. Case is grey reinforced plastic —tough, lightweight, easy to clean, won't crack under extreme temperatures.

LOOK TO PARTLOW FOR:
Recording Controls Indicating Controls
Non-indicating Electrical Controls
Non-indicating Mechanical Controls Timers
Recording and Indicating Thermometers
Limit Controls Combustion Safeguards

PARTLOW

For more facts circle 605 on Reply Card

NEW PRODUCTS

(Begins on page 148)

60 to 120 lb. It features a multiple-fall pulley system with a three-to-one mechanical advantage for handline operation. According to manufacturer, it permits one unskilled workman to lower, relamp and clean, and then reposition heavy high-bay lights within minutes—all at floor level with a "dead" fixture. Triplex Hangers are available with a variety of suspension assemblies. The Thompson Electric Co.

39—FIRST AID STATION for plant-wide use

Small enough to mount close to hazardous areas, yet large enough to hold necessary first aid items, this cabinet is reported especially useful where immediate first aid treatment must be given to prevent serious organic injury. Each of the cabinet's doors has a positive action catch that cannot open as a result of nearby vibration, manufacturer announces, and other safety features are rounded-corner construction, one-piece doors and platform base. The cabinet is 66 in. high, 24 in. wide and 12 in. deep, it weighs 52 lb, is white enameled. General Scientific Equipment Co.

It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 217-218. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

40—ACOUSTICAL TILE is decorative, lightweight

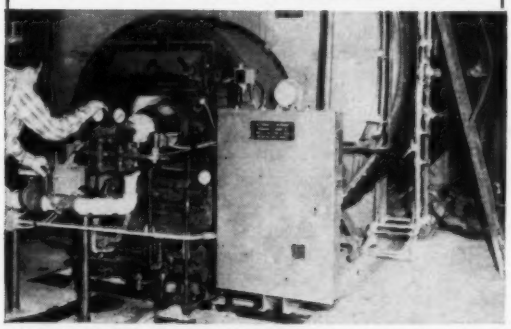
Rigid and light in weight, Claritone is a perforated, cellulose-fiber acoustical tile available in several decorative patterns. Tests are reported to show noise reduction coefficients in a range up to 0.80 depending on pattern and method of mounting. Claritone also comes with a random but balanced placement of varied size, sound-deadening perforations. Regular Claritone has evenly spaced, regular drilled holes, with uncompressed walls for greater sound absorption. The tiles are finished with a fade resistant white acoustical paint to give a uniform, evenly matched textured matte surface with an AMA "a" reflection value. They are also available with a flame-resistant surface.

Manufacturer says Claritone may be

NEW DRY ACID CLEANERS

—based on Du Pont Sulfamic Acid remove boiler scale safely, effectively

HOW ONE MAN DESCALED A 3,200-GAL. BOILER IN ONLY SEVEN WORKING HOURS!*



Heavily fouled 500-hp boiler had to be cleaned without interrupting plant work schedule. It was decided to use a dry acid cleaner, based on Du Pont Sulfamic Acid.

Cleaning results were impressive. 150 lbs. of scale were dissolved by the cleaner, only 3½ lbs. remained (above). The entire job took only 7 man-hours.

*Complete story on request from Du Pont.

DU PONT
SULFAMIC ACID

DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

New acid cleaners are easy to handle and non-fuming —dissolve in water to form low-corrosive solutions

Now—acid cleaners you handle *dry!* No fumes, no handling or spillage worries. When mixed with water, they have the penetrating power of liquid acids but are far less corrosive. That's because they contain a remarkable ingredient—Du Pont Sulfamic Acid.

Sulfamic acid-based cleaners remove scale and deposits from a wide range of heavy or light equipment, including steam boilers, steam cylinders and heat exchangers. These acid cleaners can be added while some types of equipment are in operation.

For more information on sulfamic-acid-based cleaners, and the names of formulators who offer these new compounds, mail the coupon below.

E. I. du Pont de Nemours & Co. (Inc.)
Grasselli Chemicals Dept., Wilmington 98, Del.

Please send me: ☐ sulfamic acid general equipment-cleaning bulletin; ☐ names of formulators offering cleaners based on sulfamic acid.

*Name*_____

*Company*_____

*Address*_____

*City*_____ *State*_____

For more facts circle 606 on Reply Card

ACE Plastic Pipe

85 to 100% of your corrosion-resistant piping needs now available from 1 source

- CHOICE OF 9 DIFFERENT TYPES
- THE NEWEST OF MATERIALS
- BACKED BY 100 YEARS OF EXPERIENCE

HOW TO SELECT THE RIGHT PIPE

	TYPE	SIZES	PROPERTIES	VALVES	ASK FOR BULLETIN
1	ACE-ITE	Threaded Pipe ½ to 6″	General purpose rubber-plastic blend. Tough, impact resistant, economical. Handles most common chemicals to 170°F.	Diaphragm valves with Ace-Ite body, ½ to 2″	80-A
2	RUBBER-LINED STEEL	Flanged Pipe 1½ to 24″ and up	Strength of steel, resistance of hard rubber. Soft-rubber inter-layer aids shock-resistance. Finest for alkalis, most inorganic acids, many organic acids, all salts.	Rubber-lined C.I. Gate, Darling Gate & Check Valves to 24″. Diaphragm Valves to 6″	CE-52
3	ACE TEMPRON	Threaded Pipe 1 to 8″	Best anywhere for hot inorganic chemicals, acids, etc. to 260-275°F. Also wide variety of organics. Excellent rigidity.	— —	96-A
4	ACE RIVICLOR	Threaded Pipe ½ to 4″	Rigid PVC. Excellent aging. Good cold impact strength. Not affected by most inorganic acids and alkalis. Also good for many organics.	Diaphragm valves with Riviclor body ½ to 2″	CE-56
5	ACE PARIAN	Threaded Pipe ½ to 2″	Odorless, tasteless, rigid polyethylene, best for sub-zero uses. Best resistance of any plastic at room temp. except to acetic acid.	Diaphragm valves with Parian body, ½ to 2″	351
6	ACE HARD RUBBER	Threaded ½ to 4″ Flanged 1½ to 8″	The oldest, still tops. Extreme resistance to alkalis, inorganic acids, many organics, all salts. Ideal for chlorine, fluorine. Widest range of fittings.	Rubber-lined or plastic valves above. Also many plug valves, bibb cocks, etc.	CE-51
7	ACE SARAN	Threaded Pipe ½ to 4″ Tubing ⅛ to 1¼″	Odorless, tasteless, general-purpose. Strong, takes high pressures. Not affected by most inorganic acids and alkalis; resistant to most organics.	Diaphragm Valve with Saran body ½ to 2″. Also Saran-lined diaphragm valves to 6″ and up	CE-58
8	ACE-FLEX	Flexible Tubing ⅛ to 1¼″	General-purpose transparent flexible tubing. Non-toxic, odorless, tasteless. Can steam sterilize. Excellent for chemicals.	Ace hard rubber plug valves, bibb cocks, etc.	66
9	SUPPLEX	Flexible Pipe ½ to 2″	Non-toxic flexible polyethylene pipe. Ideal for water distribution lines, drain lines, jet wells, etc. Resistance similar to Parian. Uses insert type fittings.	Diaphragm valves with Parian body, ½ to 2″	CE-57

ACE Saran, Supplex, Ace-Ite and Riviclor are approved by The National Sanitation Foundation for drinking water.

RUBBER AND PLASTIC LINED TANKS, PUMPS, MOLDED PARTS, ETC., FOR ANY NEED

AMERICAN HARD RUBBER COMPANY

Division of Amerace Corporation

ACE ROAD • BUTLER, NEW JERSEY

SEE ACE EQUIPMENT IN CHEMICAL ENGINEERING CATALOG

For more facts circle 607 on Reply Card

NEW PRODUCTS

(Begins on page 148)

painted with flat, non-bridging acoustical paint with no loss of acoustical efficiency, or with other paints without noticeable loss of sound deadening effect. Claritone comes in 12-by-12 in. butt-joint, bevel edge tiles ½ or ¾ in. thick, and in 12-by-24 in. tiles, either ½ in. thick with tongue and groove, kerfed, or ¾ in. thick with wide flange staple channel. The tiles may be applied with adhesive, nails, screws, staples or clips. Acoustical Products Div., Baldwin-Hill Co.

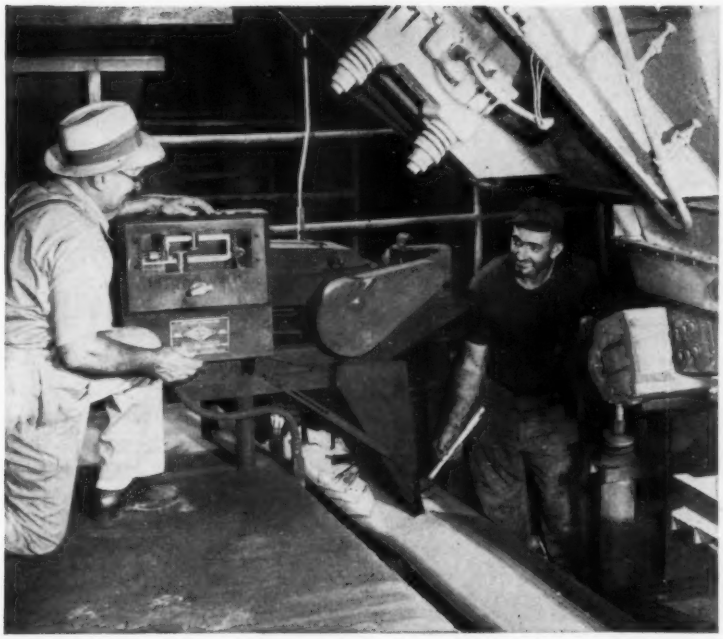
41—SILICON POWER RECTIFIER is reverse polarity type

Optional mounting bases and reverse polarity types in all ratings and mounting styles are design features claimed for this line or hermetically sealed, all-welded silicon power rectifiers for all

industrial applications. This series, rated at 45 to 150 amp (half-wave) with PIV voltage ratings from 50 to 800 v (pipe-thread, long machine thread and standard machine thread) offers reverse polarity types in each rating and mounting style. Applications for these rectifier types include battery chargers, welding equipment, plating equipment, as well as other equipment. They may be operated at base temperatures to 200 C. International Rectifier Corp.

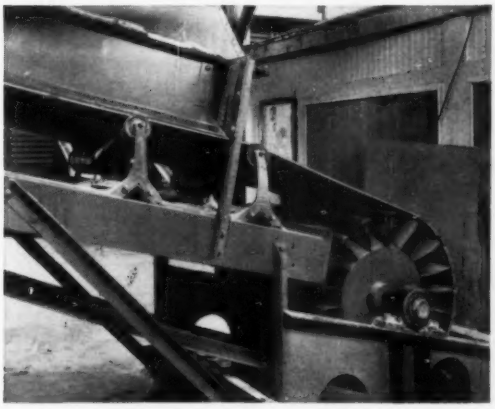
42—BUBBLER SYSTEM controls liquid levels closely

This air-operated control system is designed to keep liquid levels from varying more than ¼ in. Called a bubbler system, it is based on the principle that a drop in the level of a liquid will reduce the back pressure of air being bubbled through. This pressure fluctuation can be used to actuate a pneumatic valve on the liquid supply line. The system works like this: The end of an air line, or bubbler, is placed below the surface of the liquid. Air at 15 psi or less passes through the line,

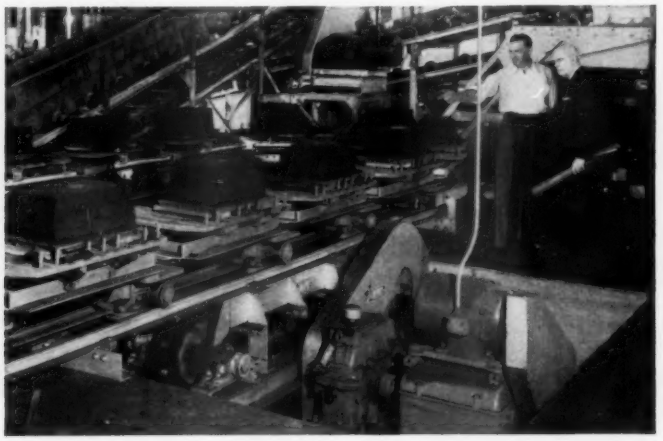


Brick sales booster: Giving the customer the color he wants helps sell bricks as well as autos. The Stone Creek Brick Co., Stone Creek, Ohio, gets the *exact* color in every batch by proportioning brick ingredients with Jeffrey Waytrols. You'll find these electric vibrating feeders in hundreds of processing plants . . *automatically* weighing and delivering *exact* quantities of material for top quality products. Bulletin 841 gives data on Waytrols.

How's your drive? If you're driving a mixing drum or other equipment at an inclined angle, you can cut the wear with this new Jeffrey "offset" chain. Jeffrey chains and sprockets are available for thousands of power transmission and conveying jobs.



Solves sticky problem. Ordinary belt conveyor pulleys often collect sticky or abrasive material on their solid faces. This wears out the belt and gets it out of alignment. Here's Jeffrey's answer: the slatted wing type pulley, described in Bulletin 898. It is self-cleaning. Belts last longer. Downtime is checked.



Thinking about automation? You should see some of the latest foundries! Materials are being moved and processed like clockwork . . . at the push of a button. Did you know Jeffrey is the leader in this field? Our service includes not only unit machines but completely engineered foundry systems, like that shown.

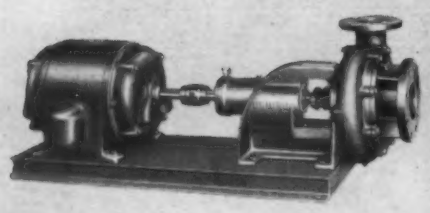
Mechanize it with Jeffrey machinery and save. Your materials-handling and power transmission equipment will give more efficient, economical operation if you specify time-tested, dependable Jeffrey products. Convenient stock parts carried by authorized distributors. The Jeffrey Manufacturing Co., Columbus 16, Ohio.

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT
TRANSMISSION MACHINERY • CONTRACT MANUFACTURING

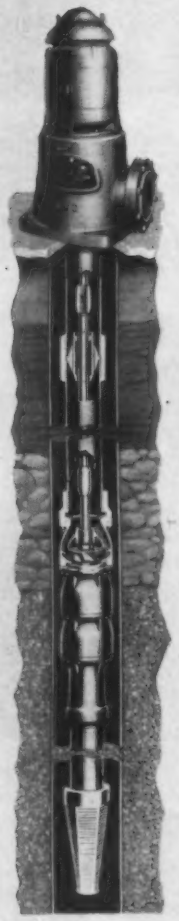
For more facts circle 608 on Reply Card

PUMPS FOR EVERY INDUSTRY



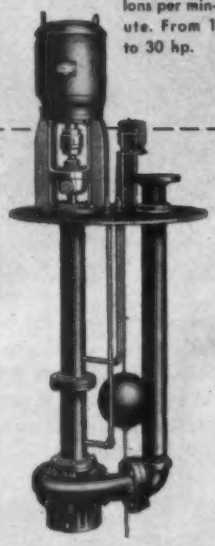
END-SUCTION CENTRIFUGAL PUMPS . . . two ball bearing type. Semi-open non-clogging impeller. Separate liquid end in standard iron or corrosion-resistant material. Optional features adapt to many requirements. Bulletin 4011.

"MOTOR MOUNT" CENTRIFUGAL PUMPS . . . pumps range from 1½" to 5" discharge . . . capacities to 1200 gallons per minute. From 1 to 30 hp.



VERTICAL TURBINE PUMPS . . . for wells 4 to 16 inches I.D. Capacities 15 to more than 3500 G.P.M. Bulletin No. 4700.

MULTI-STAGE HIGH PRESSURE VERTICAL CENTRIFUGAL PUMPS . . . designed for general industrial use. Handles liquids which are non-corrosive to iron and bronze. Ideal for boiler feed service.



VERTICAL SUMP PUMPS . . . single and duplex units, designed for wet pit service. Efficient, dependable with the latest construction and design features.

DEMING
has them all

Write for complete information . . .

THE DEMING COMPANY
532 Broadway • Salem, Ohio

Please send me a copy of your Industrial Pump Bulletin 1-57-E describing pumps for every industry.

Name _____

Address _____

Company _____

City _____ Zone ____ State _____

For more facts circle 609 on Reply Card

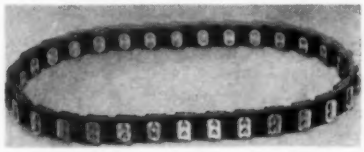
NEW PRODUCTS

(Begins on page 148)

causing a slight bubbling action. Air pressure in the line to the bubbler is also transmitted to a static pressure regulator, which, in turn, will re-position the diaphragm control valve on the liquid supply line, gradually increasing the flow of liquid into the container to regain proper level. Once installed, the level of the liquid can be adjusted over a range of 1-1/2 in. Powers Regulator Co.

43—V-S BELT adjusts to size, performance needs

The MVS Belt is described as a new type variable speed belt that can be adjusted to any desired length, eliminates vibrations and is installed without dismantling machinery. Made of



oil- and heat-resistant Neoprene, the belt is designed in a series of links held by fasteners. It comes in a wide range of sizes to replace most types of belts on variable speed drives in a wide range of industries. According to manufacturer, this belt will be available in standard packages and priced competitively with current market. Manheim Mfg. and Belting Co.

44—OUTDOOR MOTOR with improved protection, vent

Available from 250 hp and up, this weather-protected motor is designed to exceed the new NEMA Type II definition. According to company, it meets a need for an improved ambient-breathing motor which can be installed indoors or out, offer necessary weather protection and still have a pleasing appearance. Requiring up to 33 per cent less floor space than previous models, its cube-like shape allows quick cleaning and discourages dirt accumulation on frame. The frame contains no vents. Air enters louvered side openings in the top section and is exhausted from end louvers. With this arrangement, motors may be mounted side-by-side or close to other equipment without interfering with ventilation. Top louvered intakes and exhaust serve to keep out animals, weeds, etc.

Utilizing labyrinth-like passages for ventilation, the system provides for straight blow-through of air in the event of high-velocity winds. Both intake and exhaust portions of ventilat-

LOW COST DIFFERENCE BETWEEN

SLIPPING FEAR

SAFETY

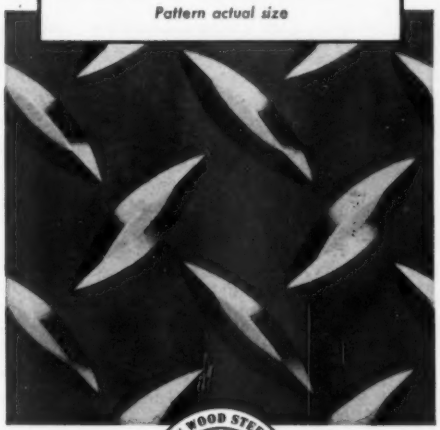
Eliminate high-cost accidents with low-cost SUPER-DIAMOND. Yes, A.W. SUPER-DIAMOND safety floor plate replaces DANGER with SAFETY wherever hazardous slipping conditions occur. Here's why!

- Raised steel, diamond-shaped figures give *maximum slip-skid resistance from all angles of approach.*
- Tough rolled steel construction lasts the life of the installation.
- Non-directional pattern—no matching problems—minimum waste.
- Easily fabricated for quick installation.
- No maintenance problems—cleans, drains rapidly.
- Use as independent flooring or flooring overlay.

Get complete . . . free . . . information that may save you thousands! Write today on your company letterhead to Dept. SD-E9.

Wherever oil, grease or other substances raise special slipping accident hazards, we suggest a check on the special non-slip qualities of A.W. ALGRIP—the world's only abrasive rolled steel safety floor plate.

Pattern actual size



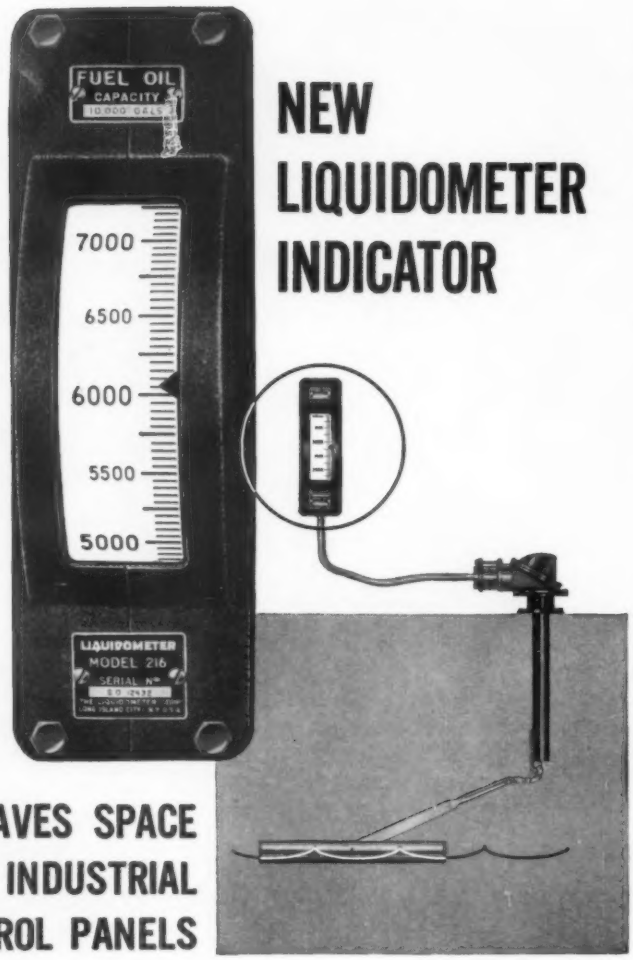
A.W. SUPER-DIAMOND
ROLLED STEEL FLOOR PLATE

ALAN WOOD STEEL CO. ESTABLISHED A.W. 1826 CONSHOHOCKEN, PA.

ALAN WOOD STEEL COMPANY • CONSHOHOCKEN, PA.

Other Products: A.W. ALGRIP Abrasive Rolled Steel Floor Plate—Plates—Hot and Cold Rolled Sheet and Strip—(Alloy and Special Grades)

For more facts circle 610 on Reply Card



NEW LIQUIDOMETER INDICATOR

SAVES SPACE ON INDUSTRIAL CONTROL PANELS

Twenty-inch dial in 3x10¼" case permits close readings

The new Liquidometer Model 216 Indicator gives the plant engineer a reliable, automatic reading of storage tank contents. Available in either vertical or horizontal design, the compact and highly readable Model 216 Indicator makes possible multiple installations on crowded control panels.

Teamed with Liquidometer's time-tested hydraulic transmission gaging system, the new indicator provides instantaneous remote indication of liquid levels—automatically. No outside power source is required. Virtually any liquid may be measured, and the indicator can be located up to 250 feet from the tank.

Engineered for dependability, the Liquidometer gaging systems highlight these design features:

- Maintenance free
- Integral temperature compensation
- Ease of installation—requires only one 2" diameter tank opening
- Safety—all gages Underwriters approved for hazardous liquids

For further details on the new Model 216 Indicator, write Dept. B.

THE LIQUIDOMETER CORP.
SKILLMAN AVENUE AT 36th STREET
LONG ISLAND CITY 1, NEW YORK

For more facts circle 611 on Reply Card

NEW PRODUCTS

(Begins on page 148)

ing system incorporate this feature to eliminate pressure build-ups during severe storms. Among features contributing to ease of maintenance are easily-removable filters, and endshield and air deflector design permitting a 300-deg inspection of windings and easy inspection of bearings, and a split bearing design permitting sleeve bearings to be rolled out, checked, and replaced without disturbing alignment. General Electric Co.

45—PNEUMATIC NAILER lessens fatigue, cuts costs

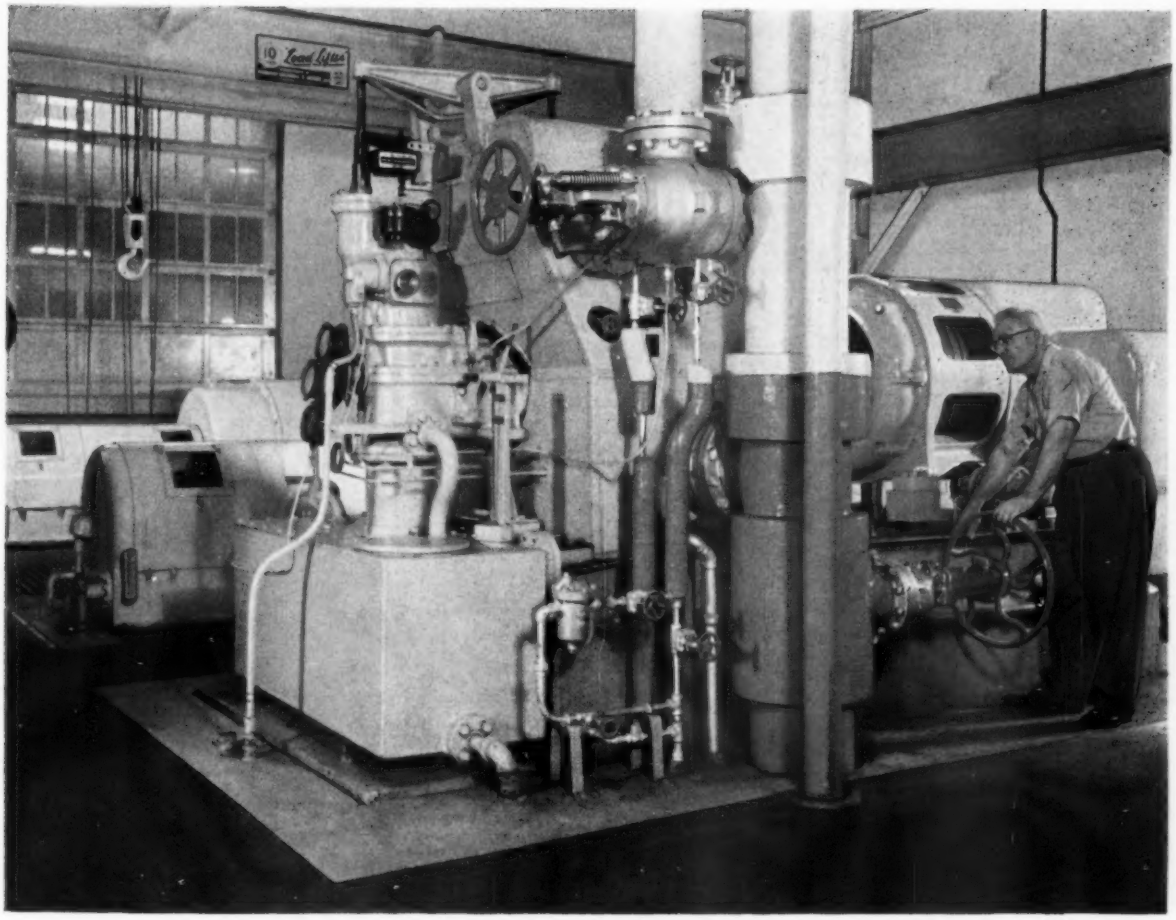
The Semi-Automatic Nailer is a pneumatic hammer attachment designed to reduce fatigue and expenses in many nailing operations. According to manufacturer, job tests have been made on overhead nailing of furring strips with 12d and 16d common nails; plas-

terboard and soft acoustical ceiling material, with 6d cement coated nails; heavy crates and hardwood pallets with hardened twist nails; prefabricated aluminum buildings with hardened screw nails; and mud sills nailed into concrete with hardened concrete nails. The nailer is readily attached to a pneumatic hammer. You simply place the nail in nozzle and the nailer starts and finishes nailing operation. Nailers are available for 6d nails, 8d to 16d common nails and 20d nails. The device is described as simple in design, practically maintenance-free, weighing less than 1 lb and only 6 in. long. Of four parts, only two move; no lubrication is required. Fox Nailer Corp.

46—CHECK VALVES for oil or raw water service

These 4000-psi spring loaded check valves feature an inverted seat design and are said to be self-cleaning. According to manufacturer, downward flow through the seat rings and past the check located below it keeps the

For more facts circle 612 on Reply Card →



Power plant, Downingtown Paper Company, Downingtown, Pa. Painting by Harry J. Sieck, Pottstown, Pa.

DO IT WITH COLORPOWER!

DU PONT PAINT PLAN BOOSTS PLANT EFFICIENCY

New way to improve plant performance: Du Pont Color Conditioning! Du Pont developed it to help create ideal seeing and working conditions in every type of industrial plant. This scientific painting plan uses the power of color to raise employee morale, promote safety, boost production. Let us show you how many ways you can put this practical system to work profitably in your plant . . . at no more cost than regular maintenance painting. Just mail the coupon below for complete information.

COLOR CONDITIONING PAINTS

DU PONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

E. I. du Pont de Nemours & Co. (Inc.) Dept. PE-84
Finishes Division, Wilmington 98, Delaware

Please send me the 28-page, color-illustrated book, "Du Pont Color Conditioning."

Name ..... Title .....

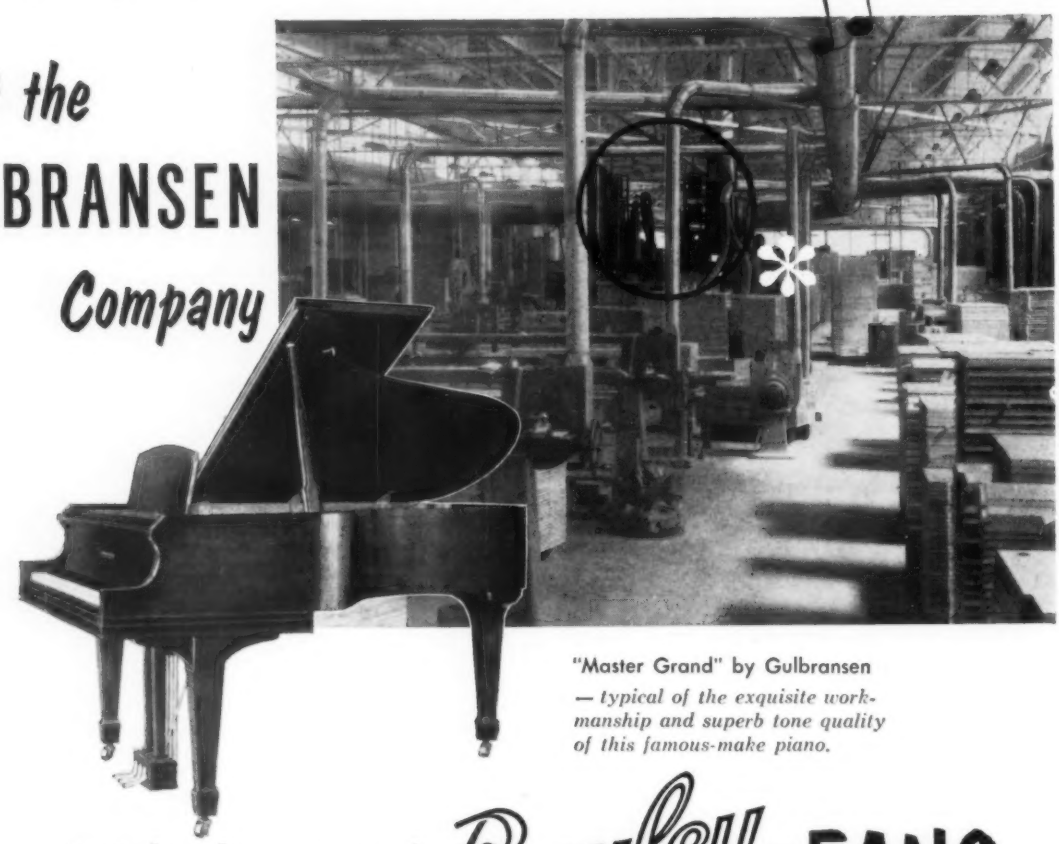
Company .....

Address .....

City ..... State .....

Keeping Plant Cleanliness on a HIGH KEY

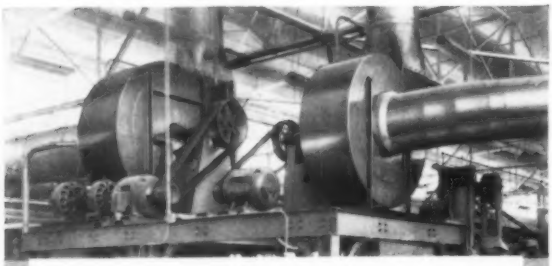
at the GULBRANSEN Company



"Master Grand" by Gulbransen
— typical of the exquisite workmanship and superb tone quality of this famous-make piano.

...With the aid of Bayley FANS

✻Two large EX Fans serving main shavings exhaust system. CFM totals 48,000.



STANDARD "EX" FANS...
as installed in the Gulbransen plant for exhaust and materials handling, are designed to handle effectively any equivalent problem you may encounter in your own production operations. Bayley specialists are always ready to help you.

The highest possible degree of freedom from dust, trash accumulation, and atmospheric impurities is particularly essential in a plant where a fine product like Gulbransen pianos are made. Utmost efficiency in the design, the apparatus, and the installation of the fan system is necessary to assure these conditions. Large capacity BAYLEY "EX" Fans, installed by Vastine Engineering Co., Chicago, efficiently exhaust dust and waste products at the modern Gulbransen plant.

BAYLEY BLOWER CO.

Engineered Air Handling Equipment
1825 S. 66th Street • Milwaukee, Wisconsin

For more facts circle 613 on Reply Card

NEW PRODUCTS

(Begins on page 148)

sealing surfaces free of foreign particles that might cause leaks. Flow area through the valve is claimed equal to or greater than the transverse area of nominal size extra heavy pipe. Available in sizes from ½ to 2 in. NPT, these valves are reputed to afford excel'ent resistance to corrosion. Valve body and seat retainer are Navy M bronze; seat, stem and guide are stainless steel, and spring is Inconel. Stem and seat are replaced by removing the seat retainer. O-rings seal retainer and seat. Sinclair-Collins Valve Co.

47—RECORDING UNIT with plug-in range resistor

This 5-in. strip chart potentiometer recorder with plug-in range resistor features is available with a variety of ranges for thermocouple, resistance bulb and linear millivolt spans. The recorder also offers a wide range of chart speeds from 1 in. per hour to 2 in. per second. Total panel space required is 9-5/8 in. wide by 8-1/2 in. high, and the recorder weighs about 25 lb. Westronics Inc.

Use the Reader Service Cards provided on pages 217-218 to ask for more information on these products. Circle item numbers of products in which you are interested.

48—PIPE LINE INSULATOR is tough, corrosion-proof

Model 57 is a plastic insulator said to be impervious to moisture, corrosion and decay, and to combine strength with long life and ease of installation. Designed to absorb load shocks and provide cathodic protection at pipe line crossings, the insulator is available in size ranges from 2 through 36 in. Composed of glass fiber reinforced polyester, it is compression molded at controlled high temperature and high pressure. It is ribbed inside to prevent cold flow of the pipe wrap and has been tested in excess of 18 tons and temperature tested in excess of 400 F in boiling pitch. F. H. Maloney Co.

49—DIGITAL VOLTMETER is all-electronic unit

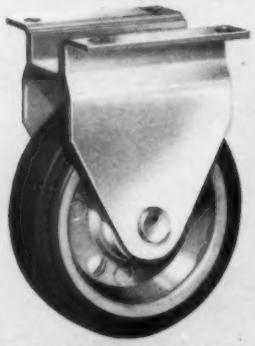
Model 5350 is designed to measure d-c and a-c voltage and resistance to accuracies of 0.5 per cent. The instrument is equipped with an automatic polarity indicator, decimal position in-

NØELTING **Faultless Casters**

. . . and 2-way phones speed up stock delivery

Here's another Faultless way to speed up trucking and increase profits. Weingarten's, Houston Super Market, combines 2-way stock checker-to-warehouse phone system for ordering replacement goods, with Faultless Caster equipped stock trucks for immediate delivery of up to 600 pounds of goods to keep shelves filled, and keep customers buying. The all-steel trucks used for this job are equipped with four Faultless 1100 Series Swivel Plate and two 1700 Rigid Companion Casters—selected by Weingarten for their ability to give perfect service.

Series 1100 Double Ball Bearing Swivel Faultless Casters have two large-diameter hardened race-ways and two full rows of hardened, ground and lapped ball bearings for maximum swiveling ease. The top ball retainer, horn and lower ball retainer are formed of heavy gauge steel. Renewable Rubber Tired Wheels assure quiet operation and floor protection.



Series 1700 Rigid Plate Casters are available with wheel types and sizes, load ratings and overall heights to match Companion Series 1100 Swivel Plate Casters.

Ask your Distributor

Your nearby Faultless Industrial Distributor maintains a substantial inventory of Faultless Casters for immediate delivery. He and one of the strategically located Faultless Sales Engineers are available to work with you in every handling problem in your plant. Both are listed in the Yellow Pages, under "Casters," beneath the Faultless heading.

Send for FREE illustrated literature

The Facts story of the Weingarten installation tells in detail how one Faultless Caster user solved a complex materials handling problem. Write for your copy.

Faultless Caster Corporation
Evansville 7, Indiana

Please send copy of Weingarten "Facts."

Name_____ Title_____

Firm_____

Address_____

City_____ State_____

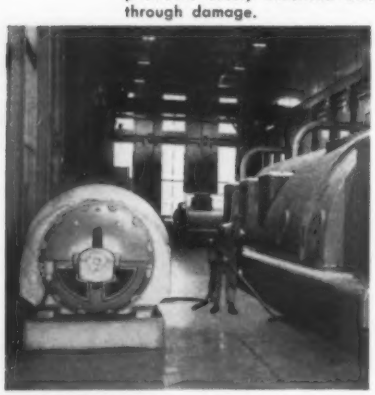
For more facts circle 614 on Reply Card

LAMSON

Exidust®

The Best Plant Insurance You'll Ever Carry

Removing chips instead of blowing them prevents costly machine down-time through damage.



Exidust keeps floors clean in this company's turbine room.

A Lamson Exidust Central Vacuum Cleaning System removes dust particles that not only shorten machinery life but can cause serious accidents. With it, you can improve working conditions through cleaner work areas, eliminate fire and explosion hazards, recover valuable spilled materials.

Systems range from 5 to 100 H.P., will handle up to 36 operators simultaneously.

Exidust removes explosive dust, preventing a serious fire hazard.

Cleaning inner walls of this grain bin maintains strict sanitary conditions.

LAMSON

Write today for the 20-page Bulletin E-6, "Lamson Exidust Systems."

LAMSON CORPORATION

408 Lamson Street, Syracuse 1, N.Y.

Plants in Syracuse and San Francisco, Offices in Principal Cities

For more facts circle 615 on Reply Card

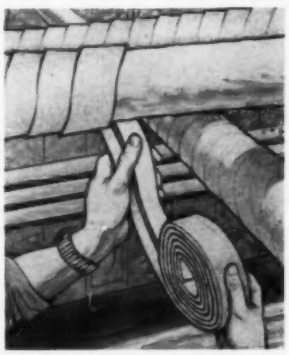
NEW PRODUCTS

(Begins on page 148)

dicator lights, oven controlled reference voltage for calibration and a-c d-c switch-type probe. Readings to 150 per cent of full scale are properly indicated even if the input goes beyond the range setting, company notes. Selectable ranges are: d-c volts ±1/10/100/1000; a-c volts ±1/10/-100/1000 rms; resistance 10k/100k/-1M/10M. Sampling rate is variable, may be externally controlled. Berkeley Div., Beckman Instruments, Inc.

50—ASBESTOS WRAP protects electrical cables

Labor-saving Insulwrap is an asbestos tape 3/16 in. thick, designed to replace three layers of 1/16-in. listing tape as fire protection on electrical cables wherever they cross or run side-by-



side. It is claimed ideal for protecting cables in underground manholes, and to offer rugged insulation and reduced application costs when used on pipes carrying steam, chemicals, hot and cold water. It may be overwrapped with vapor sealing to prevent condensation. Insulwrap comes in 1- and 2-in. widths in 25-ft rolls; both have an extra half-inch of listing tape that overlaps each spiral for a tight fit. General Asbestos Gasket Mfg. Corp.

51—METAL REMOVAL SYSTEM protects water supplies

This compact pressure diffuser method of iron and manganese removal is intended for either large or small installations. The system is composed of a vertical, cylindrical pressure chamber or diffuser into which compressed air is injected through a perforated distributing device near the tank bottom. Raw water, flowing through, becomes saturated with sufficient oxygen to oxidize any iron and manganese present in the water before it reaches the filter bed.

A solenoid valve, in the air line

"Take a tip from me—

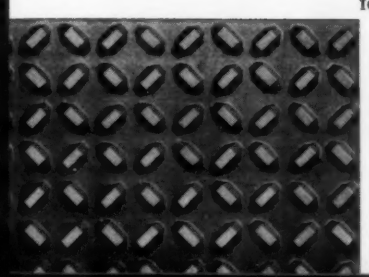
One slip can cost more than USS Multigrip"

Have you safe-treaded *all* the danger spots in your plant and on your moving equipment? Accidents may be costly—but they can be prevented. The safe tread offered by USS Multigrip Floor Plate provides positive traction in any direction.

Multigrip is studded with hundreds of little cleats shaped like those on a football player's shoe. They are flat on top—comfortable to walk on—and safe, wet or dry.

Not only does Multigrip protect workers, but it protects floor surfaces, too. It is rugged, heavy-duty steel plate that will last for years with no maintenance. It's easy to keep clean. A quick "once over" with broom or hose will get it spick and span; there are no closed pockets to hold dirt, and water drains quickly in any direction. Get Multigrip from our local distributor near you.

USS and Multigrip are registered trademarks.



Sold by leading distributors from coast to coast

United States Steel Corporation–Pittsburgh
Tennessee Coal & Iron–Fairfield, Alabama
Columbia-Geneva Steel–San Francisco
United States Steel Supply–Warehouse Distributors
United States Steel Export Company

USS United States Steel

For more facts circle 616 on Reply Card

New *FLITE*-CHEK tool

STOPS

fastener in its jaws!

PLYWOOD DEMONSTRATION

INTERCEPTOR JAWS (Cutaway)

ONLY IN EMERGENCIES DOES THIS HAPPEN— — —

Unexpected soft spots in construction material hold no hazard for FLITE-CHEK. This new RAMSET® tool stops the fastener before it leaves the tool—prevents accidental escape!

Load and fire fast: no screwing or unscrewing of stud or piston either before or after firing—a double saving in time! Interceptor jaws work automatically. No delay or inconvenience.

Do an 8-hour job in 32 minutes with RAMSET FASTENING SYSTEM—the *engineered* method of fastening to steel and concrete. A squeeze of the trigger does tedious jobs instantly!

Now RAMSET, traditionally the safest powder-actuated fastening tool made, **is again first with the best**... safer than ever for work in concrete and steel.

Call your dealer for a FLITE-CHEK demonstration today. He's listed under "Tools" in the yellow pages. See the complete RAMSET-SHURE-SET® line of fastening tools.

OLIN MATHIESON CHEMICAL CORPORATION
Ramset
CHEMICAL CORPORATION

Ramset Fastening System

WINCHESTER-WESTERN DIVISION
OLIN MATHIESON CHEMICAL CORPORATION

12133-D Berea Road • Cleveland 11, Ohio

For more facts circle 617 on Reply Card

NEW PRODUCTS

(Begins on page 148)

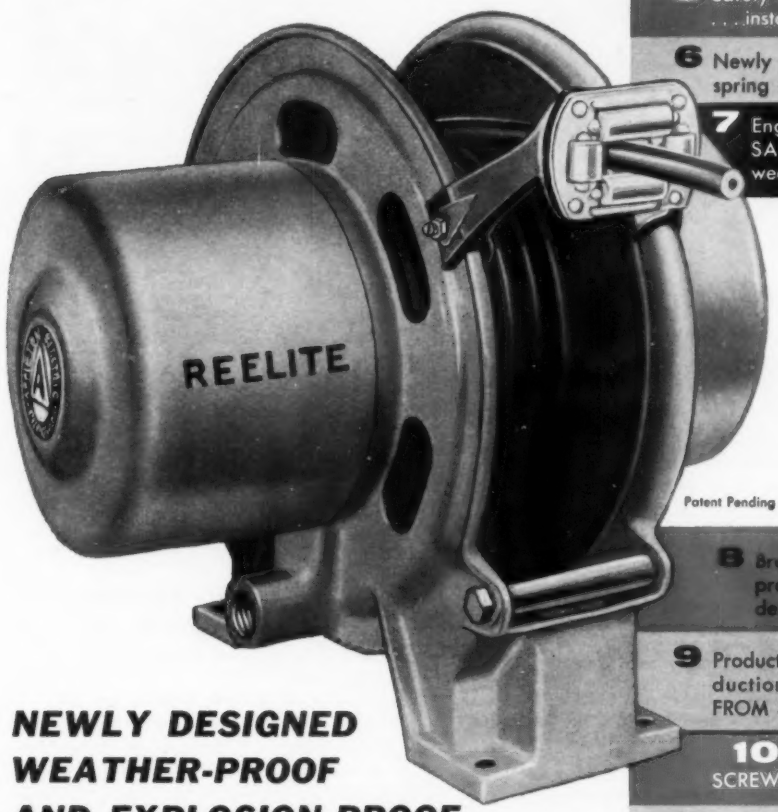
between compressor and diffuser tank, and energized from the pressure switch controlling the operation of the well pumps, automatically stops and starts flow of water through diffuser tank. A pressure relief valve, in the air line between the solenoid valve and diffuser tank, serves to eliminate excessive pressure on filters in case the solenoid fails to operate. A needle valve in the air lines ahead of the solenoid valve permits manual proportioning of air in relation to the amount of iron contained in the water. Free air entrapped in the water entering the filters is released when the water strikes the distributor baffle in the top head of filter tank. The air then escapes through an automatic relief valve. Graver Water Conditioning Co.

52—STEEL LOCKERS with advanced design details

Penco Series 6000 is a line of steel lockers with design and construction features to provide longer wear, easier operation and improved appearance. Twelve styles are included, the most commonly used being the single tier, double tier and multiple tier locker. For space savings, the line offers two-person and duplex lockers that provide full height locker compartments for two people in the space occupied by one single tier unit. Also in this category are seven-, eight- and 16-person group locker units. Among special purpose lockers in the new line are dual lockers with vertical partition to separate soiled and clean clothing, and Air-Lite models, single and double tier, with expanded metal mesh doors that allow inspection and ventilation.

Design features announced include internal lift door handle, continuous strike door frame, intermembered tier head construction, full-loop door hinges, and an optionally available Auto-Lock. The new handle is fixed and does not move when latch is operated. It has no openings into which a bar might be inserted to force entry.

NEW from APPLETON®



1 Available in both WEATHER-PROOF and EXPLOSION-PROOF series.

2 One-piece UNI-CAST main frame . . . assures perfect alignment . . . lightweight.

3 Snap-on or threaded covers . . . NO SCREWS . . . remain tightly sealed . . . release in seconds.

4 HOLLOW SHAFT construction . . . pressure type internal cable grip . . . fast cable replacement.

5 Safety SPRING CARTRIDGE . . . self-contained . . . instantly replaceable.

6 Newly designed SPRING MOTORS . . . finest spring steel . . . longer life.

7 Engineered for easy installation . . . SAFE MAINTENANCE . . . under all weather conditions.

Every feature you want is here! . . . 15 reasons why APPLETON'S new Reelite Series gives you safe, uninterrupted service with considerable maintenance savings

Patent Pending

8 Brushes with floating tension . . . uniform pressure . . . ARC-LESS contact on newly designed collector rings.

9 Production line economies . . . volume production savings . . . immediate DELIVERY FROM STOCK.

10 No special tools required . . . only a SCREW DRIVER needed for maintenance.

11 MULTIPLE CONDUCTOR units available . . . wide, dependable electrical contact surfaces.

12 Wide range of ACCESSORIES . . . custom installations.

13 Internal RATCHET available. Will prevent recoil of cable, when application requires it. Specify if desired.

14 Explosion-proof models have pre-wired explosion-proof chamber from collector rings to junction box . . . designed for HAZARDOUS AREAS.

15 Custom assembly . . . constructed by experienced REELITE technicians.

Write today for Bulletin 504, contains complete information.

NEWLY DESIGNED WEATHER-PROOF AND EXPLOSION-PROOF

REELITES

automatic cable take-up reels

THE STANDARD FOR BETTER REELS

APPLETON ELECTRIC COMPANY

1709 Wellington Avenue • Chicago 13, Illinois

APPLETON ELECTRIC PRODUCTS®

Also Manufacturers of:

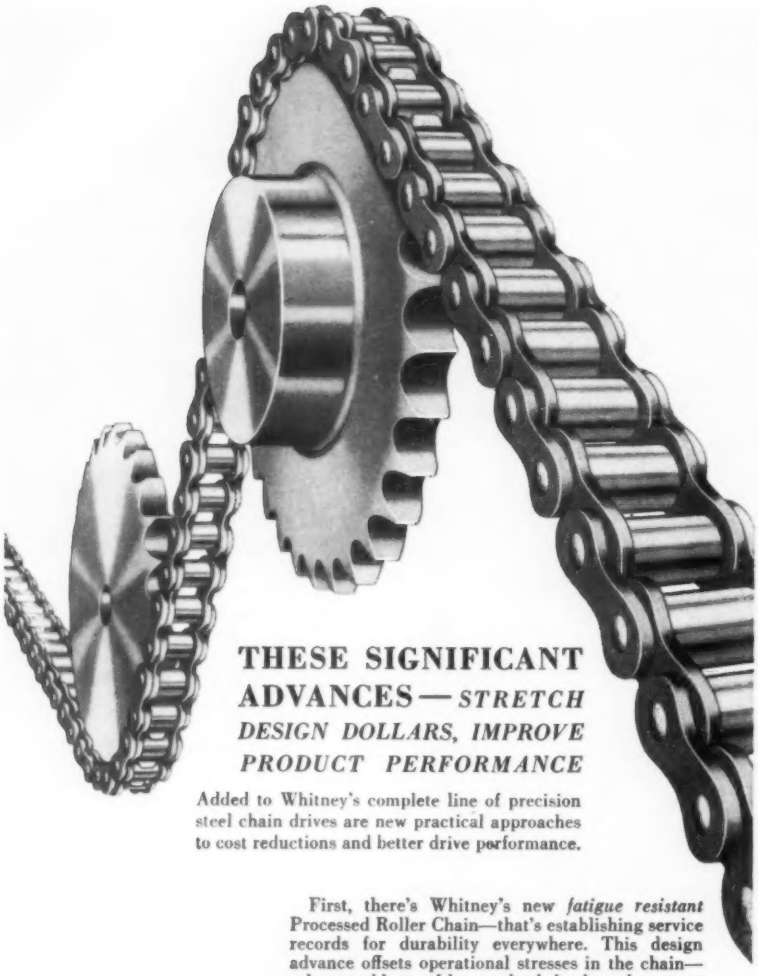
Malleable Iron Unilet Fittings

Explosion-Proof Fixtures

Outlet Boxes

Industrial Lighting Equipment

For more facts circle 618 on Reply Card



THESE SIGNIFICANT ADVANCES — *STRETCH DESIGN DOLLARS, IMPROVE PRODUCT PERFORMANCE*

Added to Whitney's complete line of precision steel chain drives are new practical approaches to cost reductions and better drive performance.

First, there's Whitney's new *fatigue resistant* Processed Roller Chain—that's establishing service records for durability everywhere. This design advance offsets operational stresses in the chain—solves problems of heavy shock loads and severest operating conditions.

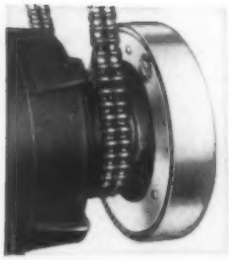
Then there's Whitney's Self-Lubricating Roller Chain—with sintered steel bushings that "oil from the inside"—are pre-lubricated for life. Ideal for installations where conventional chain lubrication may not be practical or desirable. Outlasts conventional chain as much as 5 to 1 in severe operating environments.

And if space limitations or weight are serious factors in power transmission, the new, *compact* Whitney High Capacity Roller Chain may be an effective solution.

Complete details on these design advances will be gladly supplied you.

Factory trained field engineers are available for practical recommendations on all of your chain and sprocket design problems.

Whitney Chain distributors and factory warehouses provide fast off-the-shelf service on a complete line of ASA roller chains, conveyor chains and stock sprockets.



Heard About Whitney-Tormag Magnetic Drives?
For complete motor overload protection, cushioned starts and high efficiency, ask about our new permanent magnet, self-contained power transfer unit. Available in 1 and 2 H.P. units as stock items, additional sizes up to 15 H.P. will follow.
Write for literature.

Whitney
CHAIN COMPANY
302 Hamilton St., Hartford 2, Conn.

ROLLER CHAIN • CONVEYOR CHAIN • SPROCKETS • FLEXIBLE COUPLINGS • WHITNEY-TORMAG DRIVE

For more facts circle 619 on Reply Card

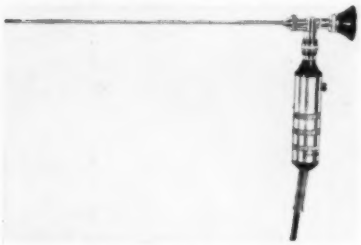
NEW PRODUCTS

(Begins on page 148)

With the Auto-Lock, the door latching mechanism is operated by a heavy-duty key. This eliminates the locker door handle, giving a flush-front appearance. Penco Metal Products, Inc. Alan Wood Steel Co.

53—INSPECTION TELESCOPE detects metal cavities

For inspecting cavities in machinery, dies and other products for the early discovery of defects, this inspection telescope is designed to save disassembly work. A lens bulb shoots a



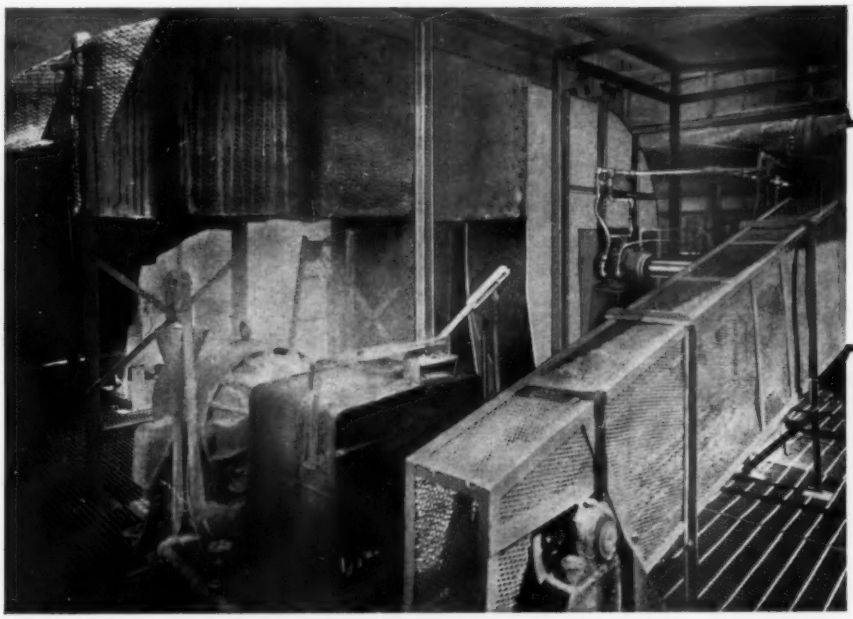
concentrated beam of light into a hole too small to insert a light probe. A ⅛ in.-diam mirror is available for side viewing holes from 0.125 in. up. Side viewing adapters are available with diameters of 0.123 to 0.500 in. A five-power telescope brings image close to eye. Eder Instrument Co.

54—CLEANING PROCESS guards against rust

Jenolizing is said to make mechanical equipment look like new, to protect it against rust, and reduce the risk of fires. The process is reported to open new practical applications for steam cleaning. Two new developments of company's Hypressure Jenny steam cleaner division are important to the process. The first is a cleaning compound, known as AP, which is claimed harmless to paint, wiring, or aluminum and magnesium surfaces. Second is a protective coating, Protect-O-Gloss, applied while the steam cleaned surfaces are still warm and wet. It serves to prevent rust and leave a glossy, like-new finish. For plants already having a Hypressure Jenny, a kit of Jenolizing materials is available. Homestead Valve Mfg. Co.

55—TRANSMITTER simplifies liquid level measurements

The 205T Volumetric Differential Pressure Transmitter is designed to simplify difficult flow and liquid level measurements, such as corrosive fluids, liquids that "jell" when not in motion, colloidal suspensions and slurries. It



One of several Clarage Type XL Fans used in this application. Fan equipped with stainless steel wheel and V-belt driven from a hydraulic coupling.

Clarage Fans have what it takes

for this tough exhaust assignment in the production of titanium dioxide

Exhausting 800° F gases from rotary calciners through scrubber units and electrical precipitators to the atmosphere.

That's the demanding task this large chemical manufacturer gave Clarage Type XL Fans.

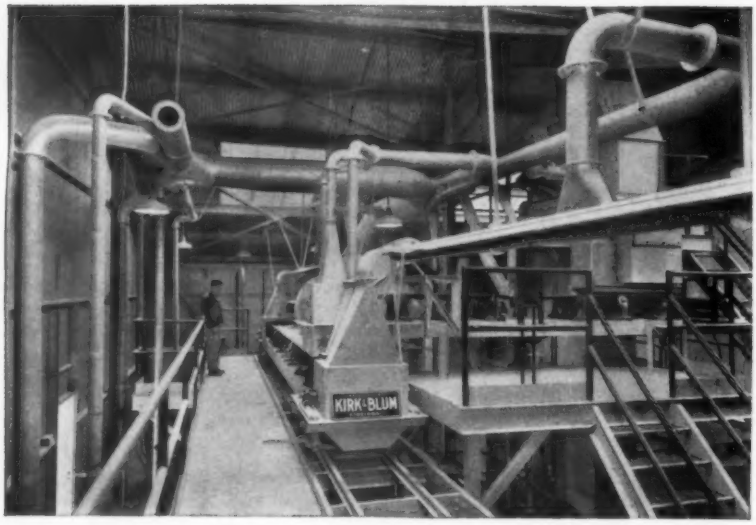
What kind of a job evaluation does Clarage receive? Several repeat orders furnish the answer. In fact, three additional Clarage Fans will soon be installed in a major expansion at this plant.

You, too, will find it pays dividends to choose the fan name of quality — Clarage. Call us in for capable assistance on your next requirements in the air handling and conditioning field. It's characteristic of Clarage equipment to prove out successfully no matter how exacting the application. CLARAGE FAN COMPANY, Kalamazoo, Michigan.

CLARAGE ... *dependable equipment for making air your servant*

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

For more facts circle 620 on Reply Card



Every "trouble point" is protected by efficiently designed hoods and ducts.

Dust Control
saves many ways at Harbison-Walker

THOROUGH ENGINEERING of a complete dust control system for Harbison-Walker Refactories Co.'s new plant at Leslie, Maryland has resulted in operating efficiencies and other benefits well worth the time and energy required.

The installation has provided (1) dust-free plant air, (2) better operating efficiency, (3) recovery of valuable silica dust, (4) lower plant maintenance and cleaning costs, (5) better working conditions, and (6) no outside air pollution.

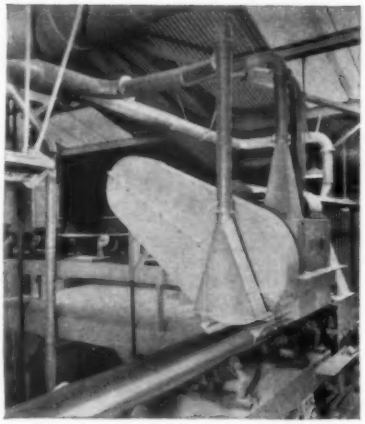
Plant-wide system keeps air clean

At every point where there is danger of dust being created or escaping into the plant, modern streamlined hoods and ducts are provided, all connected to a central system, powered by a 50 HP motor, capable of handling 25,000 CFM.

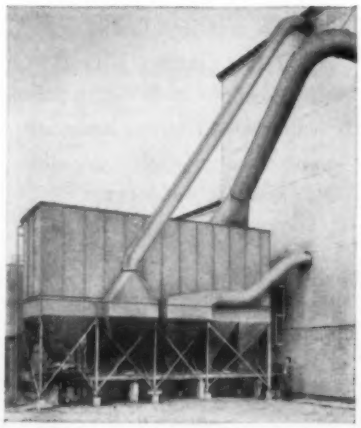
Hoods and ducts are placed out of the working area. The system collects air containing silica dust created in the processing of raw silica rock, draws it to a filter, cleans the air, and returns the collected material to bins as a product component.

Waste is eliminated and plant working conditions are kept at a level assuring greater worker productivity.

The complete installation was designed, fabricated and installed by The Kirk & Blum Manufacturing Company, Cincinnati. Information concerning Kirk & Blum Dust Collection Systems may be secured by writing to the company at 3189 Forrer Street, Cincinnati 9, Ohio.



Hoods and ducts are located so as not to interfere with working areas. Keeping plant air clean safeguards workers.



Dust laden air is cleaned in this Multibag filter. Recovered silica dust is returned to mixers for re-use.

For more facts circle 621 on Reply Card

NEW PRODUCTS

(Begins on page 148)

provides a standard instrument which eliminates a variety of special installations and winterized lead lines usually required between transmitter and process. The entire sensing system is factory-filled with silicone compound and permanently sealed.

Two types of sensing unit assemblies are provided: one for mounting flush with inside of chemical tee for pipe installation; the other for mounting on a standard 3-in. flange. The temperature limit is 300 F at the sensing diaphragms. Pressure limit of the instrument is 1500 lb. The system is limited only by the flange rating on the primary side. The sensing elements directly contact the fluid in the pipe or tank at two points, and relay the pressure differential to the secondary portion. Since conventional lead lines are not required, the transmitter can be at ground level with sensing elements overhead. Taylor Instrument Cos.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 217-218.

56—FLEXIBLE LACING for troughed conveyor belts

Minet-Splice is described as an easy-to-use, high strength flexible lacing for troughed conveyor belts. Templates, drilling and hole punching are not required for this heavy-duty, hinge-type splice, manufacturer states, and it is installed in one piece. As the conveyor operates, the hinge plate separates into sections at pre-scored notches to conform with conveyor trough curvature. The one-piece design is said to assure the closest possible fit. High strength—reported up to 68 per cent of belt tensile limit—is attributed to the method of fastening which employs pointed rivets which separate but do not cut the fabric. The splice is designed to go smoothly around small diameter pulleys and facilitate adding and removing belt sections. It is available for belts 3/16 to ¾ in. thick, up to 60 in. wide. General Splice Corp.

57—MERCURY LAMPS with sealed-in reflectors

These R60 and R80 Reflector Mercury Lamps are offered for low, medium, and high bays as well as for outdoor

See them Now!

Industry's MOST WANTED line of GENERAL PURPOSE VALVES

FOR PETROLEUM REFINERIES
CHEMICAL PLANTS • POWER PLANTS

Write for Supplement No. 1 to Catalog F-9

Address Dept. 24A-FPLE

MOST WANTED — that's right — because the G P line includes gate, globe, and angle type valves having seats faced with **HAYNES STELLITE*** alloy or other hard facing alloys for greater seat-wear resistance . . . at no extra cost!

Hard faced seats, in combination with precision finished, selectively hardened discs and wedges give these valves amazing resistance to erosion, corrosion and galling. That's why they are setting new standards of performance in steam, water, oil, or gas services at the recommended pressures and temperatures.

Get longer, drop-tight, service life with minimum maintenance by specifying Vogt G P Valves. Available in a complete range of sizes from ¼" to 2" and rated 800 pounds at 850°F. and 2000 pounds at 100°F.

HENRY VOGT MACHINE CO.
P. O. Box 1918 — Louisville 1, Ky.

SALES OFFICES: New York, Chicago, Cleveland, Dallas, Camden, N. J., St. Louis, Charleston, W. Va., Cincinnati, San Francisco

Vogt — GENERAL GP PURPOSE — Vogt FOR BETTER VALVES

DROP FORGED STEEL

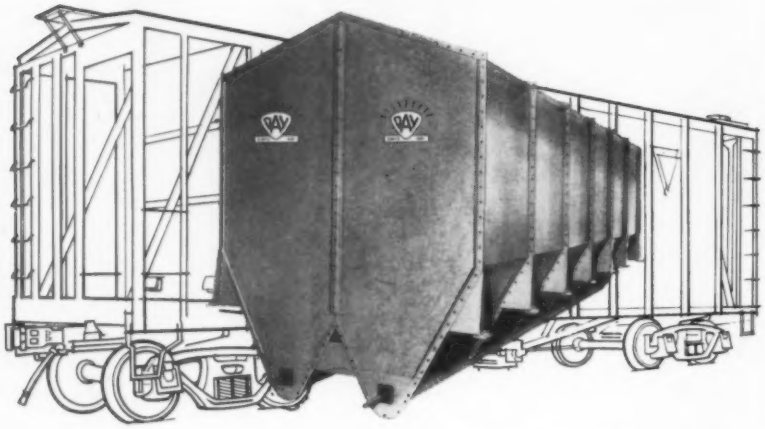
VALVES

*Trade-Mark of Union Carbide and Carbon Corporation

For more facts circle 622 on Reply Card

DAY

BULK STORAGE NEWS



A CARLOAD OF STORAGE IN ONE 'PACKAGE'

SAVE! Store Ingredients in bulk with **DAY** Tanks

Here's a "package" that's engineered and built for heavy duty service. Compared to bags or other containers, DAY Bulk Tanks store more materials, in less space, faster, better and cheaper. By eliminating bag and labor costs they save up to 35¢ on every 100 lbs. of bulk material handled.

DAY tanks are large enough to actually store a carload or more of material in a single tank. They may be pneumatically or mechanically loaded and emptied. Made in vertical and horizontal styles, DAY tanks are built and shipped in easily erected sections. They have been proven in a wide range of applications. They are sturdily constructed of galvanized, black or stainless steels or aluminum.

Write toDAY for Bulletin 574. This 12-page booklet gives specifications plus money saving facts about sanitary, weatherproof DAY tanks.

The **DAY** *Company*

SOLD in UNITED STATES by
The DAY SALES Company
807 Third Ave. N.E., Minneapolis 13, Minn.

MADE and SOLD in CANADA by
The DAY Company of Canada Limited
12 Brydon Drive, Rexdale (Toronto), Ontario

Representatives in Principal Cities

EQUIPMENT ONLY OR A COMPLETE SYSTEM

For more facts circle 623 on Reply Card

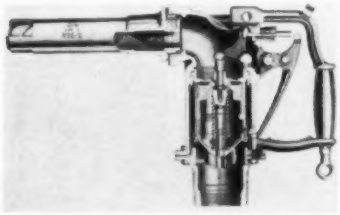
NEW PRODUCTS

(Begins on page 148)

illumination of parking areas and for security purposes. The R60 is weatherproof, company points out, and meets the need for a 250-w mercury lamp which can be easily installed at low cost without an enclosed fixture. The R80, a 700-w mercury lamp, is also weatherproof and can be used indoors or outdoors without an enclosed fixture. Both lamps have sealed-in reflectors said to stay bright permanently without cleaning or loss of efficiency. Bases are nickel-plated brass to prevent corrosion or freezing in sockets. A clamp base provides extra support for the R80. The lamps come in three types: Merco-Spot, Merco-Flood and Merco-White, for three light patterns. The 700-w R80 Merco-Spot is designed to produce 120,000 beam candle power without any fixture. Radiant Lamp Corp.

58—FILLING NOZZLE has high flow capacity

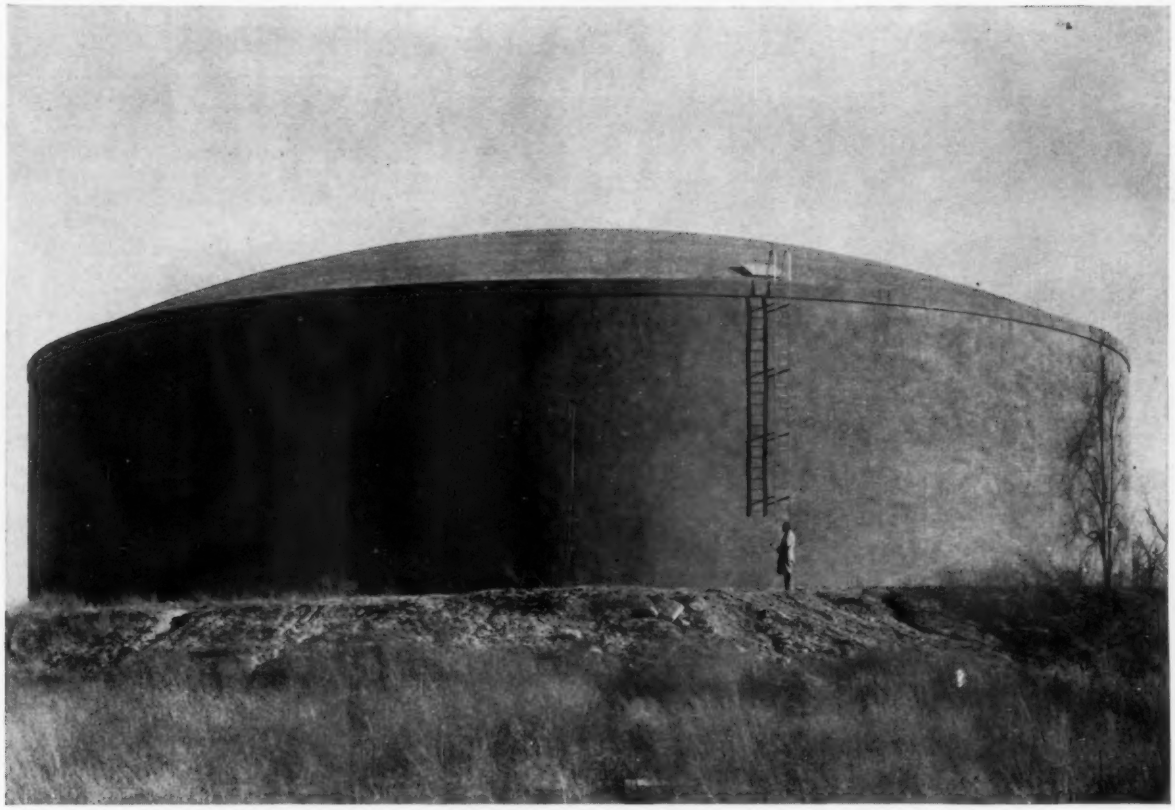
No. 620 Filling Nozzle is announced as featuring high flow capacity (220 gpm at 50 psi) and shockless closure. Oversize flow areas assure maximum



discharge and minimum pressure drop, company says, and adjustable slow-closing mechanism prevents line shock, even on pressures up to 100 psi. It is available in 2-, 2½- and 3-in. sizes. Its high-tensile aluminum alloy body has strength of bronze, it is stated, at ⅓ the weight. Bronze trim, with composition seats are among features. Bulletin F-39 gives details. Jordan Industrial Sales Div., OPW Corp.

59—TUMBLING BARREL utilizes liquid carbon dioxide

This low temperature insulated tumbling barrel uses liquid carbon dioxide instead of dry ice. It is claimed to cut deflashing time up to 50 per cent for soft molded rubber parts. The unit develops temperatures from 0 to —120 F through direct expansion of liquid CO_2 within the barrel. According to company, adjustments are made so fast tumbling can be started immediately. Since it is also a controlled



This prestressed concrete water tank was constructed in Kettering, Ohio, by Preload Concrete Structures, Inc., Westbury, L. I., N. Y. The Parlon-based finish, "Moisture and Chemical Resisting Enamel," is made by the Lowe Brothers Co., Dayton, Ohio.

200 GALLONS OF PARLON-BASED PAINT PROTECT THIS 3,000,000-GALLON TANK

There are many reasons for the ever-increasing preference of paints based on Hercules Parlon® chlorinated rubber. Wherever protective coatings must meet a challenge from the weather or the corrosive effects of chemicals, Parlon-based paints are providing longer service at lower long-term cost.

For this water tank in Kettering, Ohio, the coating selected had to meet two main tests—it had to be attractive and it had to require little maintenance. Parlon passed on both counts. Only 200 gallons in a single coat were needed to provide the tank with an attractive green coating. Fifteen months later the paint job retains its "just like new" look.

Perhaps the many unusual properties available in Parlon-based coatings can solve your own maintenance problems. Your local paint supplier can provide additional information, or write direct to Hercules.

Cellulose Products Department

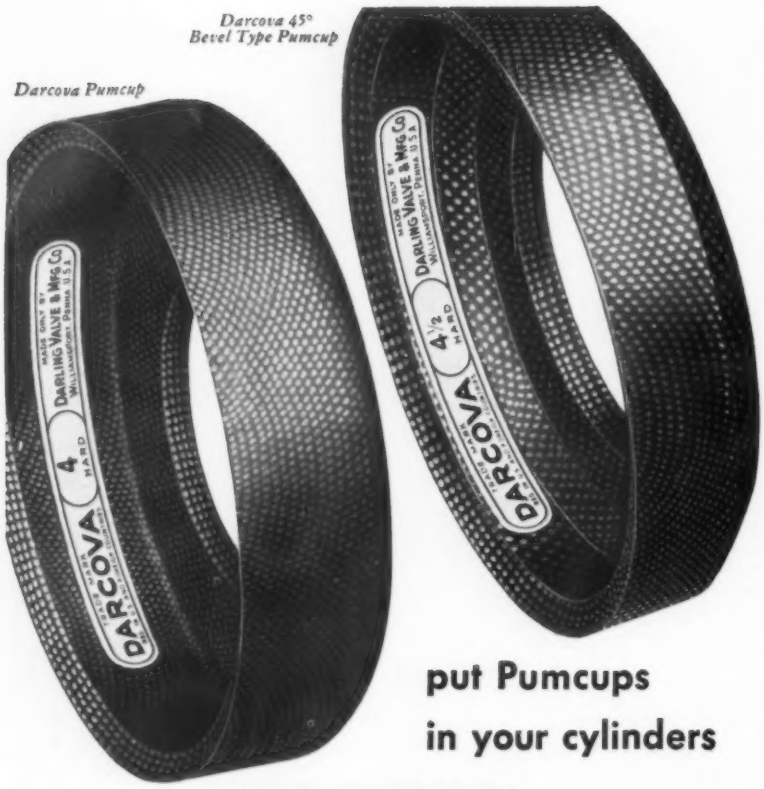
HERCULES POWDER COMPANY

INCORPORATED

900 Market Street, Wilmington 99, Delaware

CR58-2

For more facts circle 624 on Reply Card



put Pumcups
in your cylinders

TO HOLD PRESSURE LONGER!

In Darcova Pumcups a sound engineering principle has been combined with precision tolerances and extremely durable compositions to provide exceptional efficiency and life in hydraulic, air, and reciprocating pump cylinders of all kinds.

Unlike ordinary piston packing, precision Pumcups are engineered to minimize friction load while hugging cylinder walls on every pressure stroke. Regardless of eventual wear, efficiency *stays* high! So there's far less down-time and need for replacement.

Pumcups are made in a wide range of sizes, types and texture-engineered compositions, including 100% Nylon, for all kinds of pressure-temperature-fluid conditions. Send for Pumcup Bulletin 5503 and weigh all the facts!

DARLING VALVE & MANUFACTURING CO.
Williamsport 14, Pa.

DARCOVA
THE ORIGINAL COMPOSITION CUP
TRADE MARK
PUMCUPS

For more facts circle 625 on Reply Card

NEW PRODUCTS

(Begins on page 148)

temperature system, operating temperatures remain constant, to give more uniform results. Additional benefits from use of the CO_2 tumbling barrel include economy, since only as much of the CO_2 is used as needed to maintain desired operating temperature, and reduced storage facilities required. Tumb-L-Matic, Inc.

60—CEMENT pressure-bonds nylon to nylon

Nylosil 820 is a pressure-bonding cement requiring no priming, welding or heat curing. It is intended for bonding nylon extrusions and moldings to nylon, and nylon to metal. Joints made with Nylosil 820 are described as impermeable to water and hydrocarbons and resistant to chemicals, and having flexibility and high tensile strength. They set at room temperature. Ions Exchange and Chemical Corp.

61—FLOOR MACHINE is multi-purpose maintenance unit

The Convertamatic is announced as a multi-purpose floor maintenance machine which can be used for high-speed scrubbing operations. According to company, one man operating the machine in a single pass, can lay the cleaning solution, pick-up dirty solution, and damp-dry a 24-in. swath. Or, by changing from scrubbing to polishing brushes, or steelwool pads, and by snapping on a dry pick-up unit,

he can polish a 24-in. swath and in the same operation pick-up all loose dust and dirt particles.

Machine is equipped with twin 13-in. brushes, driven by ¾ hp motor, positioned to provide a full 24 in. swath. Vacuum unit is powered by a ¾ hp by-pass motor. Gasoline or propane powered models are also available. The 12 gal recoverable capacity vacuum unit on the electric model can be removed and used as a portable wet-

MOGUL-IZING wet-type dust collectors save $4,940.00 annually at HOUDAILLE INDUSTRIES, Inc.

MOGUL is added to collector through this clean out door, previously used as access for hand cleaning.

Sludge now remains soft and is easily removable. Prior to MOGUL treatment it was necessary to use a pick to loosen the hard mass.

Write for *additional Performance Reports* and complete information without obligation.

The North American MOGUL Products Company

Standard Building • Cleveland 13, Ohio

The nationally known firm of Houdaille Industries, Inc., manufacturers of high quality automobile hardware, operate twelve high speed belt polishers in the manufacture of automobile bumpers at their Huntington, West Virginia plant.

Mr. Larry E. Day, Plant Engineer at Houdaille, ran a 30 day test with MOGUL endeavoring to eliminate the sludge problem and, at the same time, to operate the system at a higher efficiency. Results were so conclusive that MOGUL is now used in the entire dust collector system.

The Houdaille savings story is another outstanding example of the advantages in MOGUL-IZING – the *modern* method of water treatment technology.

SPECIALISTS IN INDUSTRIAL WATER TREATMENT FOR OVER 40 YEARS

For more facts circle 626 on Reply Card

Each of the two illustrated troughs can carry as much cable as all of the paralleling conduit

Cope cable trough saves steel by the ton!

Problem. 100 miles of cable to be supported in a New Jersey power generating station.

Solution. A careful cost analysis of available methods and materials convinced plant engineers that Cope's expanded-metal cable trough was the best choice. Why? Among other reasons, it meant a saving of more than a ton of steel for every 60 feet of trough installed, as compared to conduit . . . a total saving in excess of 250 tons of steel for the 15,000 ft. of trough required for the completed job!

Here's How You Save. *One* 10 foot section of 24" width Cope trough supports as many cables as 16 lengths of 4" conduit and it only weighs 54 lbs., compared to 575 lbs. for this same amount of conduit. This adds up to real economy regardless of the size of your installation. Cope's expanded-metal cable trough simply uses *less* steel to do the job and obviously this can mean substantial savings for you!

Cuts Labor and Maintenance Costs, Too. Design and construction features of lightweight Cope trough speed installation of space saving systems—even in the most cramped quarters. Easy-to-get-at trough simplifies cable inspection and repair . . . provides ready re-routing and facilitates system additions.

You save *three* ways when you specify Cope cable supporting equipment . . . trough, ladder or channel.

- **LOWER FIRST COST**
- **LOWER INSTALLATION COSTS**
- **LOWER SYSTEM MAINTENANCE COSTS**

Discuss these advantages for *your* installation with a qualified Cope representative—or write to T. J. Cope Division, Rome Cable Corporation, Collegeville, Pa.

1000

T. J. COPE *Division*

ROME CABLE CORPORATION

For more facts circle 627 on Reply Card

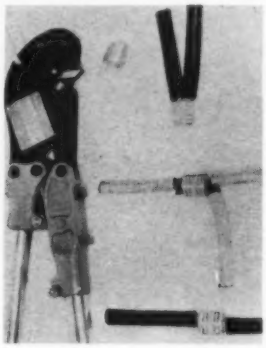
NEW PRODUCTS

(Begins on page 148)

dry vacuum cleaner. The Convertamatic has a variable speed control—so that it can be operated at a slow walk for thorough scrubbing of extremely dirty floor, or at a faster rate for less soiled areas. Under average conditions, it cleans about 12,500 sq ft per hour. Advance Floor Machine Co.

62—COMPRESSION JOINTS pigtail and splice wire

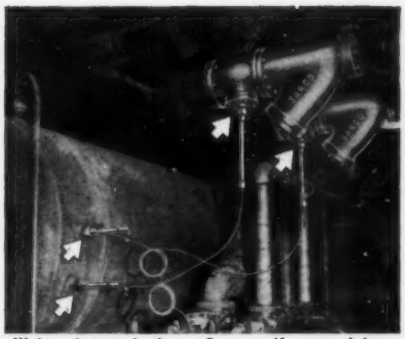
This line of compression joints for pigtailing or splicing copper conductors will take a variety of wire combinations whose diameters are less than or equal to two 1/0 copper conductors. A combination of hand tool installa-



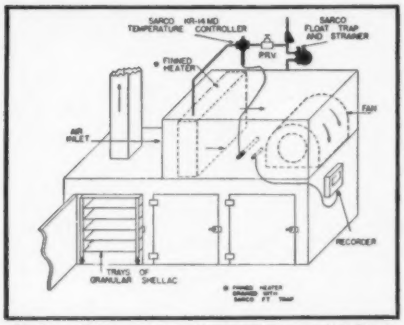
tions and color-keying assures a joint of high pull-out value and low resistance, manufacturer notes. Joint sizes from 3#12 AWG to 2 1/0 are color-keyed to dies in a TBM5 compression installation tool. Matching colors quickly provides the correct installation die for a particular compression joint. The Thomas & Betts Co.

63—BLAST BARREL has 6-ton cleaning capacity

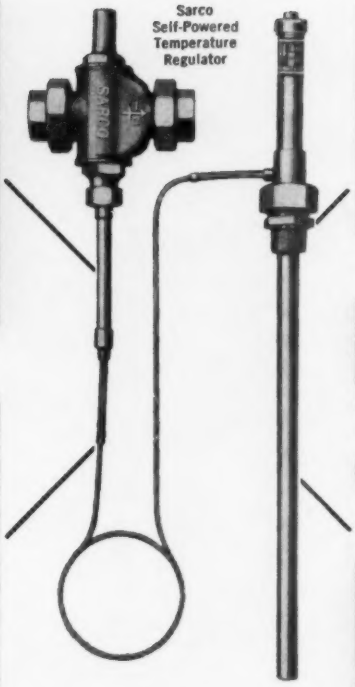
The 72 Type GN Rotoblast is announced for use in cleaning and descaling heavy metal parts in large volume. The 72 cu-ft capacity barrel is described as a heavy-duty machine with low maintenance and operating costs. It is designed to clean a 6-ton load of castings in 5 min. It is equipped with two Rotoblast wheels, each capable of throwing 120,000 lb of abrasive per hour and each powered by a 40-hp motor. Heavy-duty motors are also utilized to power the shaker conveyor, the barrel door and the abrasive elevator. Horsepower of these motors is reported much greater than that of many machines of this type. All operations of the barrel are automatically operated from a control panel. To handle large, individual cast-



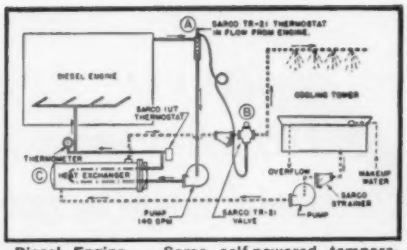
Water storage tanks — Sarco self-powered temperature controls on service water storage tanks from twin heaters.



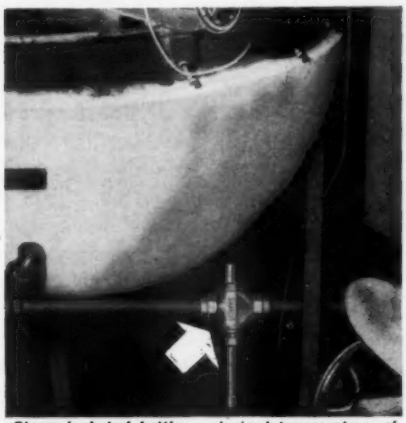
Shellac dryer — even temperature maintained; moisture uniformity of granular shellac accurately controlled — by Sarco self-powered temperature control.



FOR YOUR INDUSTRY
Chemical Processing • Metalworking
Food • Textile • Paper
Oil Refining • Others



Diesel Engine — Sarco self-powered temperature controller used on diesel engine cooling system. Also ideal for compressors.



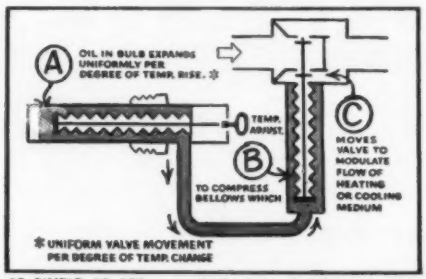
Steam-jacketed kettle — desired temperature of kettle content is automatically maintained by Sarco self-powered temperature control. Steam waste, uncertainty of manual control eliminated.

How to get Automatic Temp. Control that's simple, dependable, inexpensive

HERE's the way to get rid of uncertain, time-wasting manual temperature control . . . *throughout* your plant. And without investing in complicated, costly temperature control equipment.

These SELF-POWERED Sarco controls are inexpensive, simple, dependable, accurate. They can be used for 85% of your jobs. ½" size costs only about $100!

Thousands of these Sarco controls are giving dependable, accurate service for firms such as Colgate-Palmolive Co., Sinclair Refining Co., Swift and Co.


A
OIL IN BULB EXPANDS UNIFORMLY PER DEGREE OF TEMP. RISE. ✲
TEMP. ADJUST.
B
TO COMPRESS BELLOWS WHICH
C
MOVES VALVE TO MODULATE FLOW OF HEATING OR COOLING MEDIUM
✲ UNIFORM VALVE MOVEMENT PER DEGREE OF TEMP. CHANGE

AS SIMPLE AS ABC . . . that's Sarco Self-Powered Temperature Control. A thermostat with capillary tubing and a valve . . . that's all there is to it!

SARCO SELF-POWERED TEMPERATURE CONTROLLERS
—need no power source

1. Self-Powered — no compressed air or electricity needed.
2. Easy to install — by any pipe-fitter.
3. Self-contained — no exposed mechanism. Packless valve.
4. Simple — no gadgets that take a technician to read and repair.
5. Not affected by cross-ambient temperatures or elevation of the bulb.

Send for Bulletins: No. 620—Self-powered Temperature Controls. No. 710—Self-powered Cooling Controls. No. 1025 — Electric Indicating Temperature Controls. Sarco Company, Inc., 635 Madison Avenue, New York 22, N. Y. 2208-B

SARCO

Automatic Temperature Control

ELECTRIC INDICATING AND SELF-POWERED TEMPERATURE CONTROLLERS • STEAM TRAPS • STRAINERS

For more facts circle 628 on Reply Card

Here's a pump you can use anywhere GOULDS self-priming centripetal pump (Fig. 2520)

pumps liquid... air ...liquid and air

As a scavenger . . . handy transfer . . . for cleaning up—which way can this versatile Goulds pump work for you?

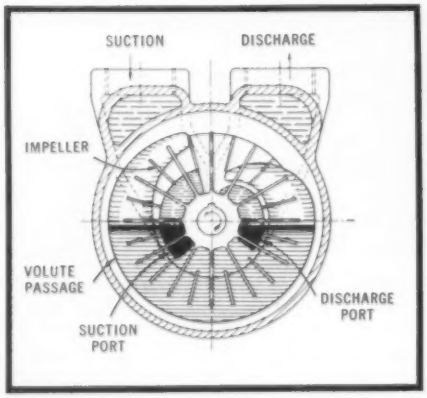
You can use it for almost anything.

Because it pumps air and liquid in any combination, it handles foaming solutions and emulsions easily. It's ideal for pilot plant work, for cleaning operations.

Once primed, it stays primed. It won't air-bind. Even with loops or leaks in your suction line, its high air-handling capacity will keep liquids moving.

Compact, lightweight, portable—it's ready in all-iron construction, or in stainless steel for corrosive service. It's offered as a mobile unit (illustrated), pump-motor unit, or pump only for V-belt drive. The pump itself weighs 42 pounds. With 1½ inch suction and discharge, capacities go to 60 GPM, heads to 80 feet.

There's a complete description of the Liquid Ring Pump in Bulletin 725.6; you can get a copy from us or from your Goulds representative.



This new self-priming Goulds pump eliminates air-binding by a unique use of *centripetal* action. The impeller forces liquids along a volute casing, building up pressure as the liquid moves to the narrow end. This pressure sets up a liquid piston action between each set of blades, forcing liquids to the center of the pump. The liquid piston forces any air entrapped in the center up through the outlet.

GOULDS PUMPS, INC.

Main Office and Works, Seneca Falls, New York

Branches and Representatives in principal cities

In Canada: The A. R. Williams Machinery Co., Ltd.

For more facts circle 629 on Reply Card

NEW PRODUCTS

(Begins on page 148)

ings weighing more than a ton each, the barrel has an extra heavy apron work conveyor. Pangborn Corp.

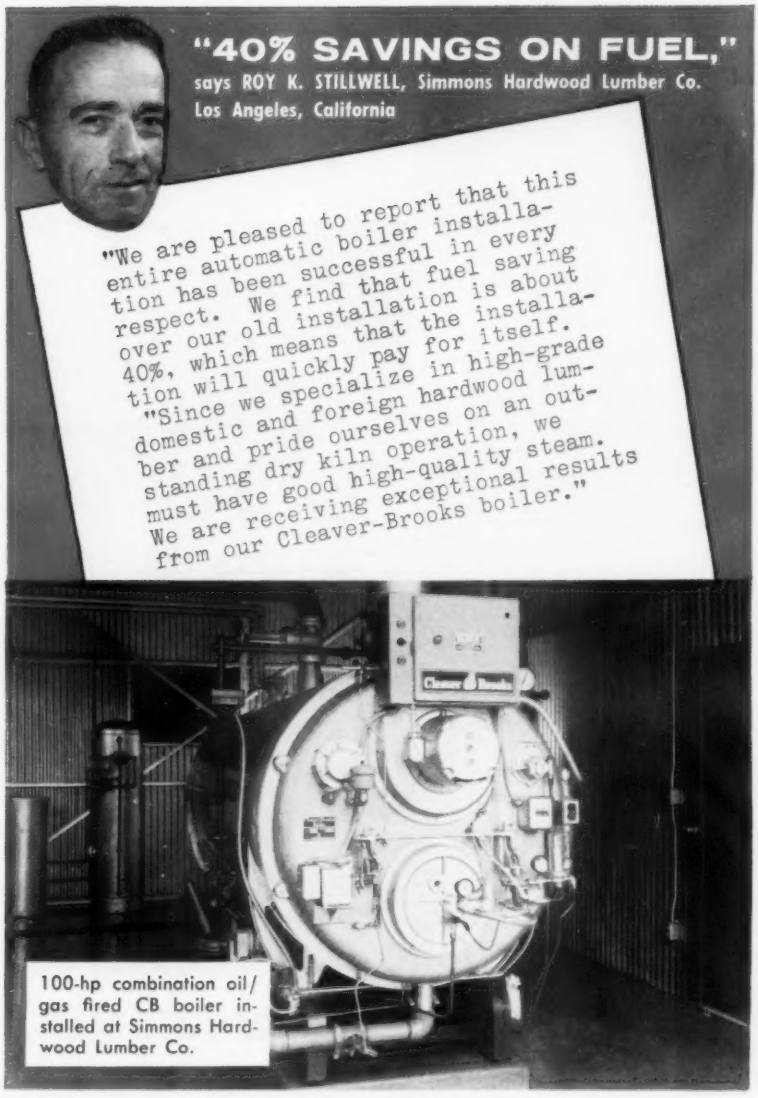
64—ADJUSTABLE MIRRORS make maintenance easier

Similar to dental mirrors, these inspection mirrors have long plastic handles, adjustable by the touch of a thumb to any angle within a 45-deg arc. With them, you can see behind gears, into a tank, inside the angle of a pipe or casting, underneath a fitting, around a corner—at practically any part hidden from direct vision. The mirror itself has a plastic frame and back. Round or rectangular style mirrors can be had in several sizes, and a magnifying mirror is also available. The mirrors can be purchased in sets as required. A trial assortment of 36 costs around $55.00. F. P. Kretchmer.

Use the Reader Service Cards provided on pages 217-218 to ask for more information on these products. Circle item numbers of products in which you are interested.

65—HAND TRUCK for mobile, flexible parts handling

Increased flexibility in storage and handling of common parts is provided by the Stackbin-Stackrack Truck. It can be used as a stock train to provide parts where and when needed. Mobility permits low cost, fast bulk replenishment of parts and/or easy positioning of supply setups at processing and assembly stations. Sizes of hand trucks are available to suit individual plant requirements. Stackracks lock to trucks without tools or fasteners. Individual Stackbins can be removed from the racks. Trucks are heavy gage formed steel of all welded construction. Mo-


"40% SAVINGS ON FUEL,"
says ROY K. STILLWELL, Simmons Hardwood Lumber Co.
Los Angeles, California
"We are pleased to report that this entire automatic boiler installation has been successful in every respect. We find that fuel saving over our old installation is about 40%, which means that the installation will quickly pay for itself.
"Since we specialize in high-grade domestic and foreign hardwood lumber and pride ourselves on an outstanding dry kiln operation, we must have good high-quality steam. We are receiving exceptional results from our Cleaver-Brooks boiler."
100-hp combination oil/gas fired CB boiler installed at Simmons Hardwood Lumber Co.

For process steam economy . . .

Install a packaged CB boiler

CB boiler four-pass design with forced draft is the most efficient combination to transmit heat to boiler water. Forced draft blower provides correct amount of air for complete combustion, eliminates the need or cost of a high, expensive chimney. Combustion gases are forced at high velocity through the four passes, literally scrubbing heat from the flame. Result: lower fuel costs.

Five square feet of heating surface per boiler hp is another reason why CB boilers give you longer service life with less maintenance. Every CB boiler is guaranteed to operate at a minimum efficiency of 80%.

Each Cleaver-Brooks self-contained boiler is a complete package. Fully factory tested, it's ready for installation, service connections and operation. No make-ready delays . . . no extra parts needed.

A trained technician starts your CB boiler, adjusts it for your specific needs, and trains your attendant in care and maintenance.

Available in 19 sizes, 130 models, 15 to 600 hp — steam or hot water, gas, oil, or combination oil/gas fired.

For more facts on the self-contained CB boiler, contact your dealer or write: Cleaver-Brooks Company, Dept. D, 364 E. Keefe Ave., Milwaukee 12, Wisconsin.

Cleaver Brooks®

ORIGINATORS OF SELF-CONTAINED BOILERS

For more facts circle 630 on Reply Card

Royal McBee Corporation
Hartford, Connecticut

Here's the ROYAL way to help build a successful personal hygiene program!

Management at the Hartford, Conn. plant of Royal McBee have been singularly successful in formulating a personal hygiene program that is paying off in better health, employee appreciation and numerous savings.

After extensive research into the problem, Royal management selected SBS-60 Cream Deodorant Soap and Dispensers to spearhead their program because of its multiple advantages: (a) effective cleansing action that combines exceptional detergency with unusual mildness. (b) a cream consistency that makes it almost impossible to waste in either washrooms or showers. (c) provides a drastic reduction in housekeeping and maintenance work. (d) affords a lanolized, antiseptic cream-type soap whose deodorant action is appreciated by both men and women.

If your responsibility is to save money and increase the efficiency of personal hygiene in your plant, we offer the practical help of our service department. Without obligation, these experienced technicians can make a simple soap recommendation or develop a complete personal hygiene program for you.

FREE: Complete descriptive information on SBS-60 Cream Deodorant Soap; SBS-30 Waterless Cleanser; and the complete SBS line of industrial hygiene products. Simply write us today.

Write Dept. 58-D3

SBS Sugar Beet Products Co.

SBS WATERLESS WASHSTATION*
"Brings the Washroom to the Worker"*

MAIN PLANT: 302 Weller St., Saginaw, Michigan
Los Angeles, California • Newark, New Jersey
CANADIAN SUBSIDIARY: Chemical By-Products, Ltd., 23 Racine Road, Rexdale, Ontario, Canada

*Trademark

For more facts circle 631 on Reply Card

NEW PRODUCTS

(Begins on page 148)

bility is provided by pull handle, two front swivel casters and two rear rigid casters. Stackbin Corp.

66—CUTTING TORCH has straight or divergent tips

Style 2500 Machine Cutting Torches feature both straight bore and divergent type cutting tips. Designed for use with natural gas, city gas, propane and liquefied petroleum gases, this equipment operates under either low or positive pressure. There are two- and three-hose models. One model is used on Travographs, Oxygraphs and Duographs (multiple-torch flame-cutting machines), and two models are for use on Radiagraphs, Camographs, Monographs and pipe cutting and bevelling machines. The straight bore type tip (obtainable in 7 sizes) is for cutting steel up to 16 in. thick, while the divergent-type tip (with a range of 8 sizes) is for cutting steel up to 8 in. thick. Air Reduction Sales Co., Div. of Air Reduction Co., Inc.

67—OUTDOOR MOTORS are protected from weather

These weather protected motors come in 250- to 1500-hp ratings and are claimed to provide reliable service in high winds, driving rain, snow, sleet and sandstorms. According to manufacturer, the ventilation system prevents entrance of wind-borne particles

and moisture by forcing the incoming airstream through a number of abrupt changes in direction and sharp decreases in velocity. Standard features include split sleeve bearings and bearing brackets that allow on-the-job removal or inspection; moisture and chemical resistant insulation; low temperature space heaters to minimize condensation during shutdown periods; inspection ports for observing oil rings while motor is operating. Bulletin 2550 describes motors. The Louis Allis Co.

STAYNEW

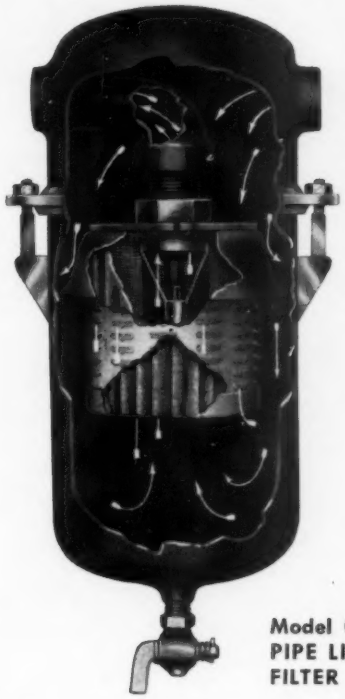
PIPE LINE FILTERS

FOR

CLEAN DRY AIR

IN

- AIR OPERATED INSTRUMENTS
- AIR OPERATED TOOLS
- PNEUMATIC CONTROLS
- INDUSTRIAL PROCESSES



Model CPHS PIPE LINE FILTER

MODEL CPHS PIPE LINE FILTER has exclusive Staynew "double action principle." Air is first deflected to outer walls of filter and forced downward at high speed. Water, oil and heavier particles of rust, etc., are thus deposited in base. Mechanically cleaned air then rises to pass through filtering medium which removes lighter airborne particles. This double action design eliminates need for frequent cleaning.

Inexpensive, simple to install and maintain, Staynew Pipe Line Filters keep your air-operated equipment free from the destructive effects of pipe scale, dust, dirt, and condensates. And, Staynew Filters pay for themselves in reduced equipment maintenance costs alone. They filter compressed air under all pressures and temperatures, natural and manufactured gases. Dollinger engineers will welcome your filtration problems. Why not call on us. Remember, Dollinger *makes* every type of filter for every industrial need.

Write for Bulletin 200 which contains complete engineering data and illustrated material on Staynew Pipe Line Filters. Dollinger Corporation, Dept. 55, Centre Park, Rochester 3, N. Y.

INTAKE FILTERS

LIQUID FILTERS

PIPE LINE FILTERS

ELECTRO-STAYNEW PRECIPITATOR

AUTOMATIC AIR FILTERS

PANEL FILTERS

SPECIAL FILTERS

PROTECTOMOTOR

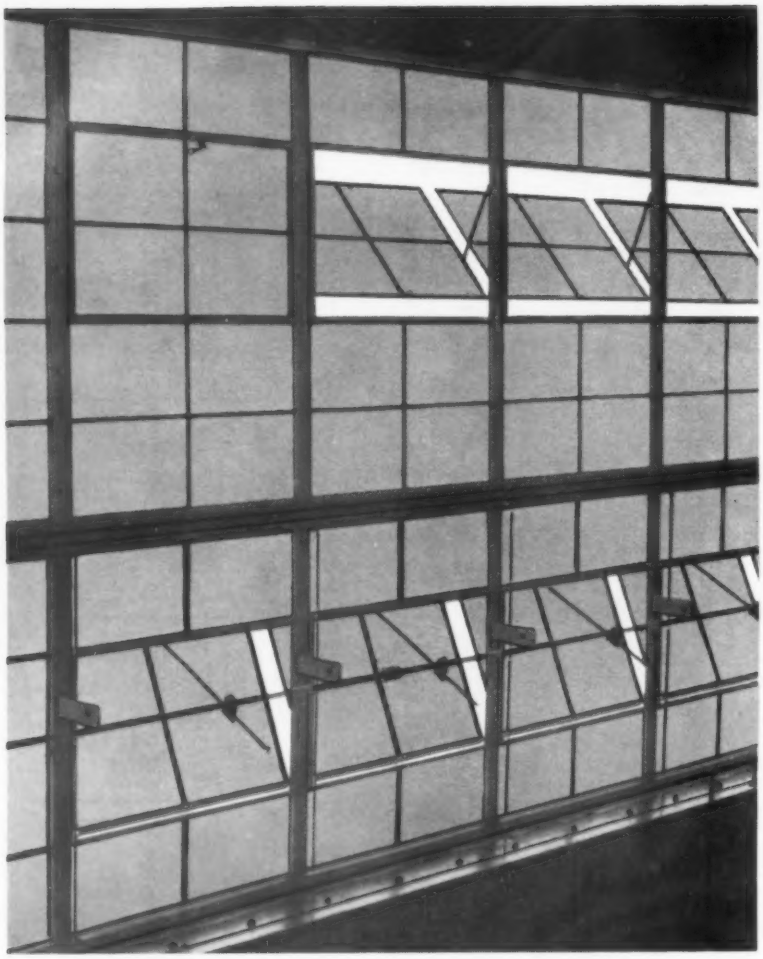
STAYNEW FILTERS

DOLLINGER

SPECIALIZING IN DRY TYPE FILTERS FOR OVER 35 YEARS

LIQUID FILTERS • PIPE LINE FILTERS • INTAKE FILTERS • HYDRAULIC FILTERS • ELECTROSTATIC FILTERS • MIST COLLECTORS • DRY PANEL FILTERS • SPECIAL DESIGN FILTERS • VISCOUS PANEL FILTERS • LOW PRESSURE FILTERS HIGH PRESSURE FILTERS • AUTOMATIC VENTILATION FILTERS • NATURAL GAS FILTERS • SILENCER FILTERS

For more facts circle 632 on Reply Card



Earthquakes, Hurricanes, Vandals can't harm Firestone's Structoglas glazing

Firestone had a world-wide glazing headache: Vandals in the States, hurricanes in Cuba, earthquakes in the Philippines made glass replacement a frequent expense. Easy-to-install glazing of shatterproof, color-fast Structoglas stopped breakage, brought in free natural light without harmful ultraviolet.

Eliminate costly breakage. Save money on your light bill. Glaze your plant *once and for all* with Structoglas—best plastic panel under the sun.

structoglas®

5802

WRITE TODAY for Firestone Case History and new Structoglas Glazing folder (SL-1). Structoglas Division of International Molded Plastics, Inc., Dept. PE4 Cleveland 9, Ohio.

For more facts circle 633 on Reply Card

Industrial Thermometers

(Continued from page 120)

which usually contains nitrogen. The temperature range of this type of instrument is -60 to 1000 F.

Class IV is a variation of Class I which contains mercury. This system is limited to 1200 F measurements.

Capillary tubes used in these pressure-actuated instruments provide remote indication at distances up to 200 ft, although response time varies with the length.

Bimetallic Thermometers—Bimetallic thermometers work on the principle of differing thermal expansion of two pieces of joined metal. This bimetallic unit serves as the temperature sensitive element and temperature readings are directly indicated by the bending of joined pieces as one expands more than the other.

This type of instrument is of metallic-self-contained, rugged construction, usually having a direct-reading pointer on a calibrated circular dial. Bimetallic thermometers are constructed to cover various short ranges or the complete range between –40 and 1000 F with accuracies of ±1 per cent.

Because they are rugged, direct-reading instruments and can be easily installed, bimetallic thermometers are considered versatile for permanent or temporary installation in industrial equipment applications. This is particularly true where the temperature measuring device may be subjected to some abuse such as shock and vibration and where readings must be made by unskilled personnel.

Tables are included to provide a qualitative as well as quantitative indication of thermometer characteristics. These tables should prove extremely useful to both the experienced as well as inexperienced persons who are interested in efficient as well as effective temperature indication. It is a known fact that when a relatively unfamiliar engineer selects a thermometer, he usually picks the most accurate instrument available, with no regard to actual accuracy required. With a brief step-by-step analysis of requirements in such a situation the person selecting thermometers can save many dollars each year. **End**

At Forest City Foundry, Wissco Belts have operated successfully under total weight loads up to 2500 pounds and temperatures of 1600°F.

FAMOUS NAMES *ride on* WISSCO BELTS

Forest City Foundry Co. • Cleveland, Ohio

The story of Wissco Belts is best told by their users. For instance, Mr. Carl Smith, Heating Foreman of Forest City Foundry, says:

"Our Wissco Belts have consistently given us good performance through a long service life and low down time."

Two Wissco Belts are used to carry castings through an annealing furnace, where temperatures range from 1100° to 1600°F, and a normalizing furnace used for stress relief of castings. The heaviest castings weigh 284 pounds each, or a total load of 2500 pounds on the 16 foot long belt.

"An operation such as ours is very hard on belts," continues Mr. Smith, "because the repeated heating and cooling cycle causes most belts to stretch beyond limits very quickly. Since we installed Wissco Belts, our belt life has been increased to two years on the average—an extremely good record.

"In addition, Wissco's spiral construction allows us to re-weave the belt quickly and simply when it becomes necessary to cut out slack. Thus, Wissco Belts have also helped us to reduce down-time."

Wissco Belts have increased the efficiency of many process-conveying operations by increasing service life and reducing down-time. Put Wissco Belts to work for you.

WISSCO BELTS
PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

CF&I

THE COLORADO FUEL AND IRON CORPORATION • Denver and Oakland
WICKWIRE SPENCER STEEL DIVISION • Atlanta • Boston • Buffalo • Chicago • Detroit
New Orleans • New York • Philadelphia • **CF&I OFFICES IN CANADA:** Montreal • Toronto

5501-A

For more facts circle 634 on Reply Card

How to get more work out of steam vessels

Here's how to increase production from steam units like autoclaves, kettles, dryers, heaters, etc., by proper trap selection. Use an Anderson dual-orifice Heat-Kwik Trap. Heat-Kwik Traps will heat up a unit 2½ times faster than a conventional trap. Here's how: Most traps vent air and drain condensate through a single orifice. Heat-Kwiks, however, have two orifices. A conventional inverted bucket orifice drains condensate and a separate auxiliary bellows orifice handles air.

This double action results in faster purging of air from cold units, boosts production and slashes steam costs. Where fast heating up is required, always insist on Heat-Kwiks.

ANDERSON HEAT-KWIK STEAM TRAPS

THE V. D. ANDERSON COMPANY
division of International Basic Economy Corporation
1939 West 96th Street • Cleveland 2, Ohio

Please send information on how to get more heat from steam units with your Heat-Kwik Traps.

Name _____ *Title* _____

Company _____

Address _____

City _____ *Zone* ___ *State* _____

Heats Up Production Units 2½ Times Faster

For more facts circle 635 on Reply Card

Formula For Plant Betterment

(Continued from page 93)

the pipes and nozzles suffered an acute attack of sulphuric acid which forced them to give up the ghost.

Shanghai Power tried various suggestions to correct it, but the sulphuric acid continued to boss the scrubber. Eventually Phoenix Engineering Corp. of New York, now incorporated in Ebasco Services, heard of the situation.

"Have you tried stainless steel piping?" they asked.

Shanghai hadn't, but they did, and for all we know, the stainless steel in that scrubber may still be keeping the fly ash from getting into the eyes of the Chinese Reds.

This case illustrates the "everybody" component of the plant betterment formula. We might have to ask everybody we know, literally, before we realize the full possibilities of achieving an efficient plant. And certainly, if we don't have a regular schedule for inspection and maintenance, a sound plant betterment viewpoint tells us to make up such a schedule right away.

Plant betterment in personnel refers to any plan that will help employees to do their work better, and with more satisfaction to themselves. The obvious approach is to offer extra training in appropriate fields, either on company time, or off it. There is some danger in designating courses, however, because not always will the company and the employees see eye to eye on what subject is good for them. This is particularly true in developing studies for craftsmen who are intensely practical by nature and are not enthusiastic over programs of remote value.

Give the class what is desired by the men and, in addition, the program betters plant operations. Small organizations without enough manpower to initiate their own training programs, can arrange for employee attendance at a suitable local school or sponsor a correspondence course. The point to emphasize is that employee training and development is a form of plant betterment that should not be overlooked by any plant, large or small.

The check-off list, Fig. 3, is offered as a guide to plant betterment, with reference to both areas for improvement and to approaches for achieving it. **End**

INTERLOCKED ARMORED CABLE

For Power Distribution in New Plants or in Modernizing Old Plants For more current capacity than cable in conduit or other armored cable, *specify and buy Rockbestos A.V.C.* . . . for easy installation on racks or hangers beneath the ceiling or next to walls, *specify and buy Rockbestos A.V.C.* . . .

. . . To eliminate costly conduits and ducts . . . to save important dollars on materials and installation time, to permit quick, easy repairs, *specify and buy Rockbestos A.V.C.*

. . . All interlocked armored cables are not alike . . . and, for maximum dollar-savings and maximum performance be sure to *specify and buy Rockbestos A.V.C.* Interlocked Armored Cable — the superior AVA Cable.

Write now for the new Rockbestos manual which gives the application and design data to help you *specify and buy Rockbestos A.V.C.*

ROCKBESTOS PRODUCTS CORPORATION, NEW HAVEN 4, CONNECTICUT

NEW YORK • CLEVELAND • DETROIT • CHICAGO • OAKLAND • PITTSBURGH
ST. LOUIS • LOS ANGELES • SEATTLE • ATLANTA • DALLAS

ROCKBESTOS A.V.C.

THE SUPERIOR A.V.A. CABLE

For more facts circle 636 on Reply Card

Have You Figured Your Ratio of . . .

daylight to dollars?

There's more than meets the eye in a brass tacks approach to the problem of the best and most economical glazing medium you can use. Before you decide on any material for windows, skylights, partitions or other openings, remember that glass and glass alone gives you the proven performance you need for better daylighting at lowest cost. Write today for catalog 58-I, containing data on translucent, light diffusing glass. Address Dept. 13.

There is no Substitute for GLASS

- It is non-combustible . . . won't burn
- It is rigid . . . doesn't sag, warp or bend
- It has a permanently hard, impervious surface, unaffected by time, abrasion and exposure to the elements
- It won't corrode or stain
- It resists chemicals, acids, solvents, etc.
- It retains its original clarity and brilliance
- It is easily installed, maintained and cleaned by conventional methods.

MISSISSIPPI GLASS COMPANY
88 Angelica St. • St. Louis 7, Missouri
NEW YORK • CHICAGO • FULLERTON, CALIFORNIA

WORLD'S LARGEST MANUFACTURER OF ROLLED, FIGURED AND WIRED GLASS

For more facts circle 637 on Reply Card

New Plant Construction

(Continued from page 138)

struction of a new envelope manufacturing plant here. Cost of the new facility, scheduled for operation by early 1959, is reported to be in excess of $500,000.

Danville, Pa.—Merck & Co., Inc., 1935 Lincoln Ave., Rahway, N. J., has plans for new facilities costing more than $5 million to be constructed at company's Cherokee Plant here for production of ultra-pure silicon and related products. New facilities will be in production by early 1959, manufacturing both polycrystalline and single crystal silicon. In addition to production facilities a technical service laboratory is being constructed for customer service.

Pittsburgh, Pa.—Gulf Oil Corp., 2900 Gulf Bldg., has announced plans for the expenditure of $564 million for expansion and improvement of production, refining, transportation and marketing facilities plus an additional $128 million in geophysical exploration, wild-cat drilling and other activities necessary to the discovery of new oil reserves. Approximately 75 per cent of the money will be allocated to the Western Hemisphere.

Old Hickory, Tenn.—E. I. du Pont de Nemours & Co., Inc., Explosives Department, Nemours Building, Wilmington, Del., has concluded plans for the construction of a new plant for the manufacture of dimethylter-ephthalate. New plant will adjoin the company's other facilities at this location and is scheduled for completion sometime in 1959.

Bellaire, Texas—Texas Co., Chrysler Towers, New York, N. Y., has announced acquisition of a 20-acre tract of land near here for a new laboratory facility. Laboratory expansion will be carried out over a period of time and will comprise multi-unit buildings. Company's announced cost of the project is $5 million.

Texas City, Texas—Wah Chang Corp., 233 Broadway, New York 7, N. Y., has announced extension of renovation work on the old Texas City Tin Smelter plant for the production of tin, tin alloys and tungsten products. Work on the project is already under way for completion by mid-1959. Cost reported to be about $2.5 million.

Neenah, Wis.—Bergstrom Paper Co., this city, plans to construct a new plant three miles south of here to house company's Waupaca, Wis., division. The division, formerly known as the Whale Paper Co., will be moved because of insufficient water supplies in the Waupaca area. Construction of the new unit will get under way at once with completion scheduled for occupancy in the first quarter of 1959.

POWELL

world's largest family of valves

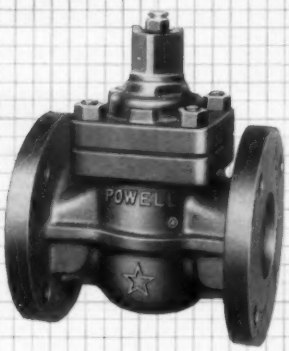


Fig. 2201 – Semi-steel Lubricated Plug Valve for 175 pounds W.O.G. Single gland type. Sizes 1" to 4". Can be supplied with screwed ends. Other types and higher pressure valves are available.

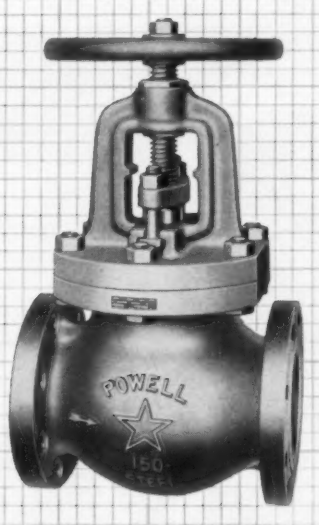


Fig. 1531 – Steel Globe Valve for 150 pounds W.S.P. Outside screw rising stem and yoke. Powell Steel Valves are available for pressures through 2500 pounds.

Fig. 1832 – Small Stainless Steel Gate Valve for 200 pounds W.P. Screwed-in bonnet, inside screw rising stem, accurately guided solid wedge disc. Also made in Nickel and Monel Metal.

Fig. 512 – Small Bronze Gate Valve for 150 pounds W.S.P. Inside screw non-rising stem. Solid wedge disc. Can also be supplied with flanged ends.

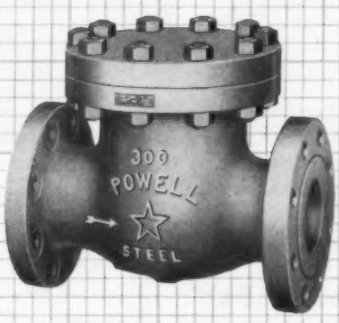


Fig. 3061A – Newly designed Steel Swing Check Valve for 300 pounds W.S.P. Has straight flow through area when disc is in wide open position.

Fig. 1444 – Large Iron Body Bronze Mounted Gate Valve for 125 pounds W.S.P. Outside screw rising stem and yoke, double wedge disc. Also available with solid wedge disc.

NO MATTER WHAT your flow control requirements, Powell offers more kinds or types of valves, available in the largest variety of metals and alloys. Powell distributors, located in all principal cities, maintain inventories to fill almost any need. For special engineering problems, write direct to:

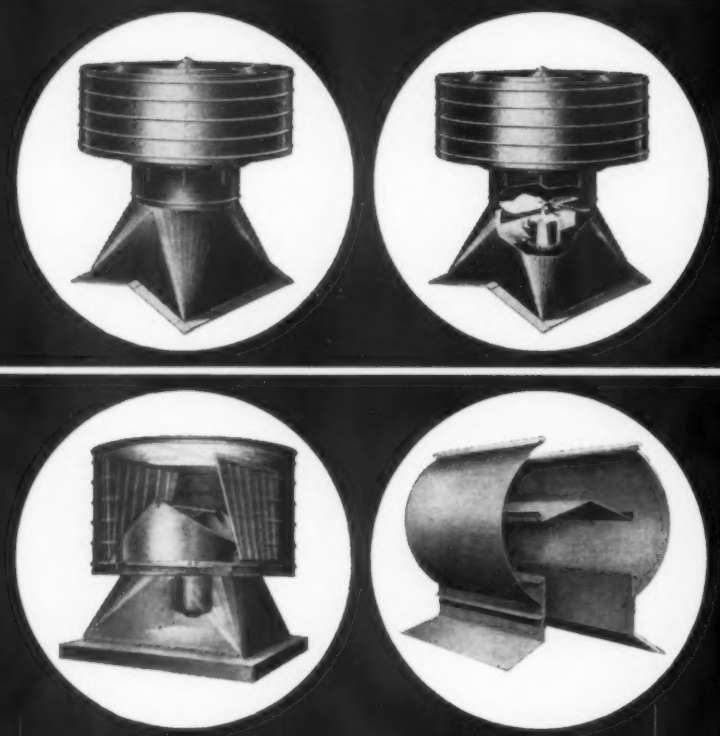
THE WM. POWELL COMPANY • *Dependable Valves Since 1846* • **Cincinnati 22, Ohio**

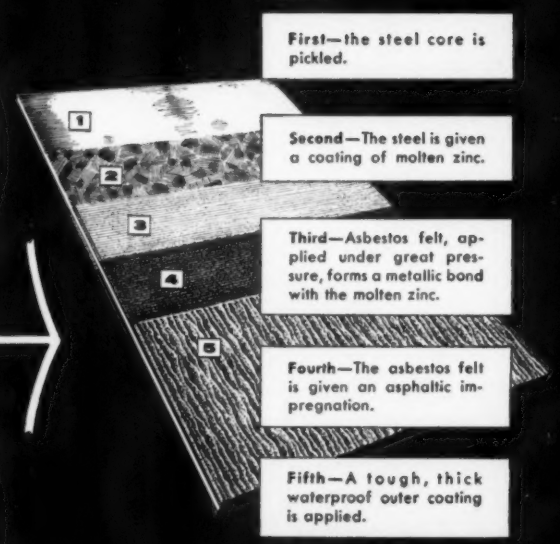
For more facts circle 638 on Reply Card

An Unbeatable Combination

ROBERTSON VENTILATORS made from Robertson Color Galbestos

You will design years of maintenance free service life into your buildings by using either round or ridge type Robertson Ventilators made of Galbestos. Ventilators are potentially the points of greatest concern in a building because of their exposure to corrosion from outside and from within and the difficulty of keeping them painted. Robertson Galbestos Ventilators require no painting, and will last as long as the roof and walls—*where Robertson has long been the world's standard.* The use of Galbestos in their manufacture enables Robertson Ventilators to withstand extreme weather and highly corrosive industrial fumes over long periods without maintenance.




First—the steel core is pickled.
1
Second—The steel is given a coating of molten zinc.
2
Third—Asbestos felt, applied under great pressure, forms a metallic bond with the molten zinc.
3
4
Fourth—The asbestos felt is given an asphaltic impregnation.
5
Fifth—A tough, thick waterproof outer coating is applied.

There is no substitute for the complete protection that Galbestos can give.

ROBERTSON GALBESTOS Ventilators

H. H. ROBERTSON COMPANY

2440 Farmers Bank Building, Pittsburgh 22, Pa.

In England—Robertson Thain Ltd., Ellesmere Port, Cheshire
In Canada—Robertson-Irwin Ltd., Hamilton, Ontario

As shown in the cutaway illustration above, Galbestos employs a unique means of bonding the multiple coatings to the metal core. This exclusive method of manufacture produces a tough, corrosion-resistant and weather-resistant roofing and siding material which provides long service life without maintenance of any kind. You get complete protection—lasting protection and efficient ventilation—when you specify Robertson Ventilators made of Galbestos.

The economical value of Robertson Ventilators lies not only in their long range qualities of durability and maintenance freedom, but also in their exclusive design and construction features. When they are installed according to a Robertson Engineered Ventilation Recommendation, you will obtain efficient ventilation with the fewest number of units . . . resulting in lower cost. For complete details and engineering assistance, send in the coupon.

Please send information on Robertson Ventilators.

☐ I am interested in Ventilators in **Colors.** (Red, Green, Gray, Buff, Maroon & Black)

NAME_____

COMPANY_____

ADDRESS_____

For more facts circle 639 on Reply Card

Ask about ROBERTSON Ventilators in COLOR GALBESTOS when you send in the coupon!

INDUSTRIAL FILMS

List Making

"THIS IS FLEXOPRINT," a sound motion picture which points out the advantages of using Flexoprint to produce or revise lists of all kinds, has been released.

The film, a 16-minute, 16 mm color motion picture, demonstrates the time, cost and work-saving advantages of Flexoprint as compared with the typesetting method.

Anyone concerned with producing lists of any kind has been invited to use this film free of charge. Arrangements for loan of this film can be made by contacting any local sales office or by writing to Remington Rand, 315 Fourth Ave., New York 10, N. Y. A descriptive folder, KD-837, is also available on request.

Roof Deck Design

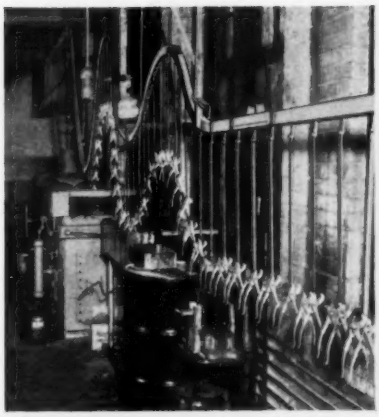
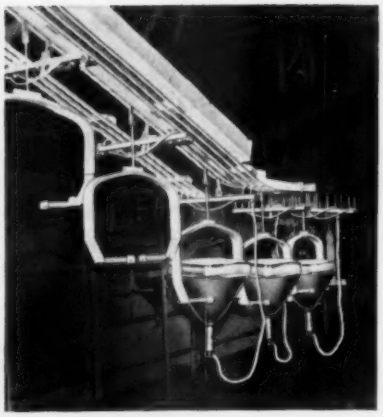
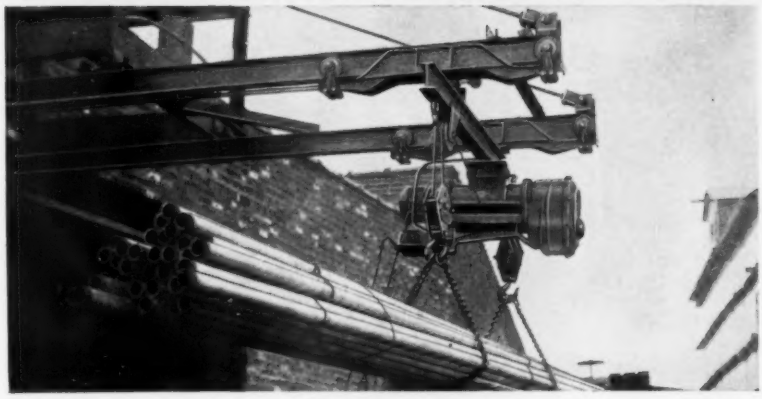
A NEW COLOR SOUND MOVIE on the design and construction of perlite concrete roof deck is now available without charge for showings before architects, contractors, engineers, builders and other interested groups in the building industry. The 16mm film runs for 20 minutes, is titled "Roof Decks Unlimited—With Perlite."

Featuring examples of perlite concrete roof decks in contemporary architecture, the movie illustrates perlite concrete's high fire resistance, its excellent insulation value and its design flexibility. Construction details are shown in the application of perlite insulating concrete roof decks over formboard systems, steel decking, paper-backed wire mesh, and metal lath. Also presented are techniques for combining insulation and drainage fill on precast or structural concrete roof slabs.

The film is available from the Perlite Institute, 45 West 45th Street, New York 36, N. Y.

Stressing Job Safety

WHAT'S IT LIKE being blind? Those who unfortunately live in a continual world of darkness have the full realization of what it is to be blind. But thousands of industrial workers throughout the U. S. are discovering daily what it is to

from pliers to TV tubes to heavy steel...

R-W OVERHEAD CONVEYOR SYSTEMS PROVIDE REAL "PROFIT-IMPROVEMENT"

Whatever it is you want to convey, from trays of minute component parts to individual units weighing up to 6 tons, it can be handled swiftly, safely and efficiently by an R-W Overhead Conveying System. From economical standard units to very complicated Automatic-Selective Conveyor Systems, engineered from economical standard components, there's an R-W Conveying System designed to solve your exact materials handling problem. Individual R-W Conveyor Systems offer the following outstanding advantages; provide a steady flow of parts to production work stations for a fast, controlled production rate ... store parts in "out-of-the-way" overhead storage banks and automatically releases them as desired ... release valuable floor area for additional production facilities ... engineered to reduce overhead costs and increase production efficiency. All of the above advantages are very important factors in helping your firm realize a much desired "profit-improvement." Economical to install and maintain ... engineered and manufactured to provide years of dependable operation with maximum efficiency. Your nearby R-W Sales Engineer will appreciate the opportunity of demonstrating how an R-W Conveyor System will solve your specific materials handling problem ... call him today!

WRITE TODAY!

- #2035 "ZIG-ZAG" CONVEYORS—CATALOG NO. A-93-R
- "TWIN-TRAK" AUTOMATIC DISPATCH SYSTEMS—CATALOG NO. F-192
- R-W MONORAIL CONVEYING SYSTEMS CATALOG NO. A-64

Richards-Wilcox MANUFACTURING COMPANY
MATERIAL HANDLING DIVISION

460 W. THIRD STREET, AURORA, ILLINOIS • Branches in Principal Cities

For more facts circle 640 on Reply Card

be blind through a unique, industrial safety training program called, "Let's Pretend." Created to develop a greater appreciation for the importance of eye safety on the part of employees in hazardous types of work, it is sponsored by the National Foremen's Institute, a division of Vision Incorporated, management services firm.

"Let's Pretend" is a "do-it-yourself" training program for industry and business which takes employees through the experience of being totally blind. Individual kits containing a number of items, such as a cigarette, shoe laces, cloth swatches, a blindfold, a toothbrush and tooth paste, a sample page of Braille, etc., are supplied to each attendee. These are used during the conduct of the program. A recording and meeting guide complete the package for companies putting on the program.

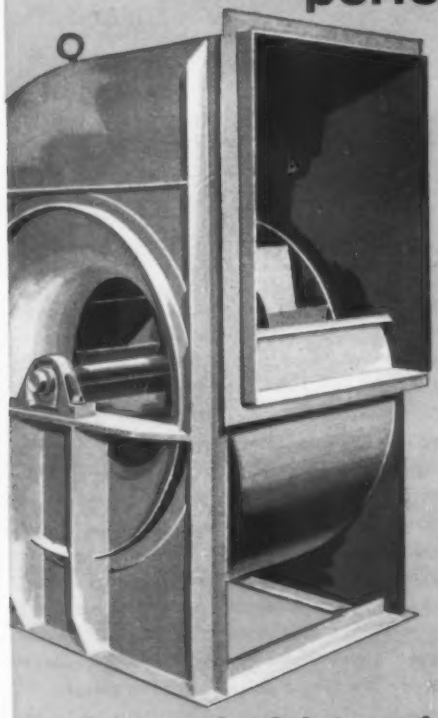
For 30 minutes, the trainees listen to a record describing the daily routine of a blind man. The group listens in total darkness. No lights are on in the room and each man wears an opaque plastic eye covering which prevents him from seeing.

This audience-participation type of training program makes the individual employee realize that safety training is given for his benefit and that he alone reaps the dividends.

The BIG year for

BIG

performance . . .



IPL

(IMPROVED POWER LIMITING)

FANS

Present day air handling problems demand BIG performance from fans. The IPL product line gives you that BIG performance because of their adaptability to an extremely wide variety of design requirements over a broad range of applications. You'll find they're extra quiet, compact, non-overloading. Make the cost-saving switch now from problems to profits with IPL Fans; write today for bulletins 561 and 572.

. . . for standard duty and heavy industrial use . . .

nyb THE NEW YORK BLOWER COMPANY

Sales offices: 3163 South Shields Avenue • Chicago 16

For more facts circle 641 on Reply Card

Conserving Water

PRACTICAL SOLUTIONS to the problems of industrial waste and water conservation are detailed in the new motion picture, "Pure and Simple."

The new film highlights ways in which industry can conserve this natural resource by combatting pollution, salvaging valuable by-products, re-circulating water and treatment sewage wastes.

"Pure and Simple" shows how these water problems are solved by installations at chemical plants, oil refineries, food processing plants, steel mills, pulp and paper mills and a sewage treatment plant. Specialized equipment is portrayed in action, and details of how various systems work are dramatized by animation.

"Pure and Simple" has a running time of 19 minutes and is available on letterhead request for free showing to those companies or sanitary engineering organizations concerned with industrial waste problems. Write to the Public Relations Department, Link-Belt Company, Prudential Plaza, Chicago 1, Illinois, to reserve a print for your showing.

Shovel Crane Operation

A NEW 16 mm, sound, color film entitled "Run Crane, Run" has a running time of 25 minutes. The film highlights design and operating features of the newest 7-ton, ⅜-yd, Lorain shovel-crane.

This machine is shown as a fully convertible shovel, crane, dragline, clamshell or hoe. The film depicts the many on-the-job advantages of its four-wheel drive, four-wheel steer carrier getting to and around the job and its smooth, digging and lifting action produced through its hydraulically controlled turntable.

Also demonstrated are simultaneous hoist, swing and travel use of the four-wheel steer to "crab" sideways to tight corners, hill climbing, highway and soft ground travel.

The film was produced for the Thew Shovel Co., Lorain, Ohio.

Variacs®

for ORIGINAL EQUIPMENT MANUFACTURERS

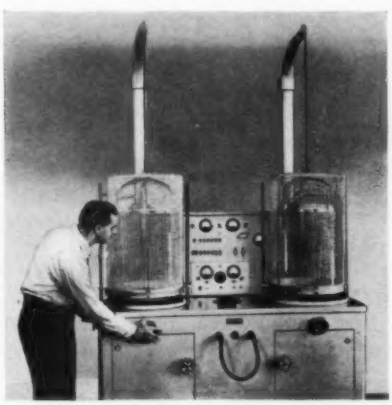
Typical of OEM Variac users is Consolidated Electrodynamics Corporation of Rochester, New York. Their line of high-vacuum pumps, stills, and metallizing equipment depends upon Variacs to provide long, reliable service for controlling laboratory and production processes.

The Evapor-ion Pump is a vacuum pump with no outlet. Titanium wire is fed into the center of the pump and is vaporized electrically. Upon striking the cooled pump wall, this vapor condenses into a thin layer. Molecules of active gases wandering into the pump strike this layer and are held as compounds by the titanium. Those gas molecules that are inert are ionized by electrons radiated from a heater filament — an accelerator grid then drives these ions into the titanium layer, where they are buried by subsequent condensation. This constant removal of air molecules by evaporation and ionization produces a pressure in the range from 10^{-4} to 10^{-9} Hg. Three Variacs are used to control titanium wire-feed rate, heater and accelerator-grid potentials.

Variacs are used as heat controls on CEC's Centrifugal Molecular Stills. These stills are capable of distilling any non-corrosive, heat-sensitive material having a molecular weight between 200 and 1200 that can be liquefied without molecular change. The model shown has sufficient capacity for pilot-plant distillation operations.

Variac continuously-adjustable autotransformers provide OEM users with high-efficiency voltage controls for a-c applications . . . All Variacs have Duratrak contact surfaces of plated silver alloy to eliminate oxidation problems that are present with bare copper brush tracks . . . Variacs can withstand initial surges up to ten times their normal ratings . . . Smooth continuous adjustment from 0 up to 117% of input is possible . . . Less than 50°C temperature rise under continuous operation . . . Can be easily designed into equipment for either panel, behind panel, wall, or table mounting . . . Available with current ratings from 2.4 to 50 amperes and may be ganged for additional capacity or polyphase operation . . . Available in ball bearing, or motor-driven forms . . . Variacs also available for 350- to 1200-cycle service . . . All Variacs are covered by a 2-Year-Warranty — additional life insurance for manufacturers who build equipment for long, trouble-free service.

Variacs for every need — Quantity and OEM discounts available . . . We invite your inquiry.



Variacs are used for controlling work heat, metal evaporation, and pump heat on CEC's High-Vacuum Metallizing Equipment. The model shown is designed for production-rate metallizing of small-sized plastic, metal, or glass pieces.

GENERAL RADIO Company

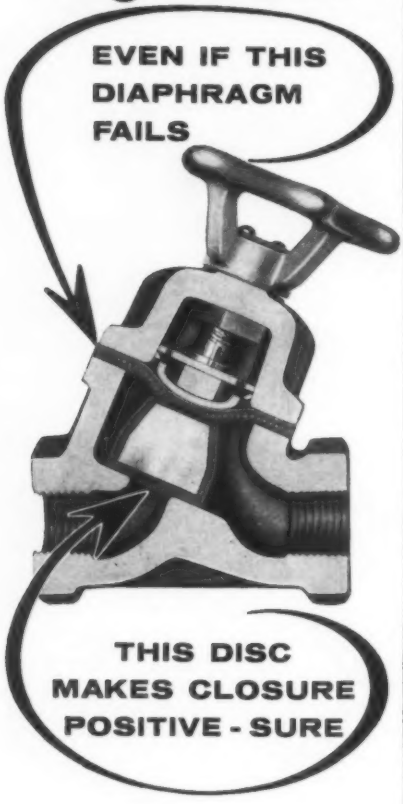
275 Massachusetts Avenue, Cambridge 39, Mass., U. S. A.

NEW YORK AREA: Tel. N. Y. WOrth 4-2722, N. J. WHitney 3-3140 **CHICAGO:** Tel. Village 8-9400
PHILADELPHIA: Tel. HAncock 4-7419 **WASHINGTON, D. C.:** Tel. JUniper 5-1088
SAN FRANCISCO: Tel. Whitecliff 8-8233 **LOS ANGELES 38:** Tel. HOllywood 9-6201
In **CANADA, TORONTO:** Tel. CHerry 6-2171

WE SELL DIRECT. Our District Sales Offices are staffed by engineers especially trained to help you in the selection of instruments and measuring systems best suited to your needs. We welcome your inquiries — will help solve your problems.

For more facts circle 642 on Reply Card

CLOSES TIGHT *regardless*



With Rockwell "D-D" Diaphragm Valves, you don't depend on the diaphragm to seal and shut-off fluid flow. This is done by the tight seating disc which will always close even should the diaphragm rupture in corrosive, abrasive, vacuum or other service.

The diaphragm serves a single purpose: to seal the valve's operating mechanism. It can be replaced without removing the valve from the line.

Rockwell "D-D" Valves provide other advantages: low closing torque; low pressure drop; high capacity; minimum maintenance. Available with lined and unlined bodies; flanged, threaded or with union ends. Get Bulletin 800.

***You're SURE - You're SAFE with* ROCKWELL "D-D" VALVES**

W. S. ROCKWELL COMPANY
2928 ELIOT STREET
FAIRFIELD, CONN.

For more facts circle 643 on Reply Card

NEW BOOKS

for the plant engineer

On Vibrations

MECHANICAL VIBRATIONS by A. H. Church. Size 9 by 6 in. approx.; 275 pp including index; illustrated; cloth bound. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. Price $6.75.

IN THIS BOOK a rigorous treatment of the basic principles of vibration analysis is presented. Knowledge of material in the book can serve as a foundation for further work in the field of mechanical vibrations.

It is recommended that prospective students of this work have completed courses in basic engineering mechanics, strength of materials, and differential equations.

Among the principal topics treated in the book are the following: undamped free vibrations; forced vibrations; two degrees of freedom; multimass torsional systems; balancing; and electrical analogies.

Engineering Management

PROBLEMS AND PRACTICES IN ENGINEERING MANAGEMENT. Size 9 by 6 in.; 132 pp; paper bound. Published by American Management Association, Inc., 1515 Broadway, New York 36, N. Y. Price $3.75 to non-members.

IDENTIFIED as Special Report No. 24, this publication contains copies of papers that were presented during an American Management Association forum in 1957. Authors of the papers are responsible men in industry, education, and the publishing business.

Each of the following is one of the topics treated in one of the four sections of the booklet: top management and the engineering program; engineering organization at IBM; programming, scheduling, and evaluating engineering assignments—the feedback approach; and organization for effective systems engineering.

On Industrial Buildings

BUILDINGS FOR INDUSTRY. Size 11⅞ by 9 in.; 309 pp including index; illustrated; cloth bound. Published by F. W. Dodge Corp., 119 West 40th St., New York 18, N. Y. Price $9.75.

THIS NEW BOOK includes material on seventy-four separate projects. It deals principally with buildings in various locations in the United States along with a few projects in other countries. In the first section of the book, design principles are discussed and proven solutions presented. Solutions have been developed by some of the world's top architects and engineers.

In addition to the design section there are six others in the book on buildings in the following categories: light industry; the consumer goods industry; utilities and service industries; warehouses; manufacturing laboratories; and heavy industry.

On Communication

AUTOMATION IN BUSINESS COMMUNICATION. Size 8 by 5½ in. approx; 146 pp; illustrated; cloth bound. Available from Vision Incorporated, 60 West 55th St., New York 19, N. Y. Price $3.95.

THIS BOOK tells the reader how to communicate effectively by way of the written report. It also contains information on the improvement of memoranda writing. There are separate chapters on punctuation, word power, and capitalization.

A useful tool in report preparation is the outline. Several outline patterns are presented in this publication. The use of illustrations in a report, such as tables, charts and diagrams is discussed. A check list of twenty-five points for the analysis of one's report is included along with the pitfalls of report writing.

Disability Evaluation

PRE-EMPLOYMENT DISABILITY Evaluation by Wm. A. Kellogg, M.D.; size 11¼ by 8¾ in.; 155 pp including index; cloth bound. Published by Charles C. Thomas, 301-327 East Lawrence Ave., Springfield, Ill. Price $10.50.

THIS MANUAL contains brief descriptions of different diseases, conditions and disabilities which may be encountered in the examination of individuals seeking employment.

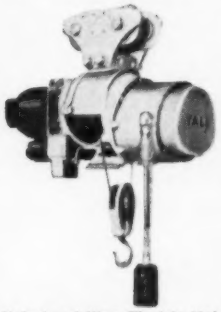
The author presents advice in this book on the disposition of applicants who are affected physically in various ways. The book deals with the application of various work restrictions along with the factors contributing to these restrictions.

Topics of some of the sections of the book are: the importance of a pre-employment examination; digestive system; ear conditions; nervous system; respiratory system; and skin diseases.

STRENGTH

Yale Cable King Electric Hoist features exclusive air-cooling system for continuous, heavy-duty lifting. Capacities: ¼ to 15 tons.

DEPENDABILITY



Yale Load King Electric Hoist: two-brake safety and quick pushbutton response. Cap: Wire Rope Model—¼ to 1 ton; Link Chain type—¼ to 1½ tons.

ECONOMY

Yale Midget King Electric Hoist works for less than two cents a day. Compact design. Lightweight. Capacities: ⅛ to 2 tons.

SAFETY

Yale Load King Hand Hoist with Synchromatic Load Brake gives instant braking action. High mechanical efficiency. Cap: ½ to 12 tons.

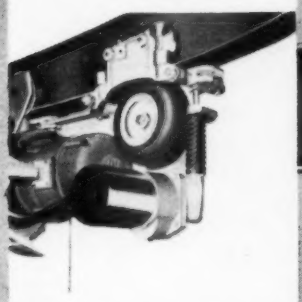
DURABILITY

Yale Spur-Geared Chain Hoist is made of the highest quality steel for long service, constant safety. Capacities: ¼ to 40 tons.

VERSATILITY

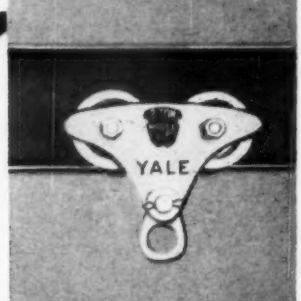
Yale Pul-Lift lifts and pulls from any angle. Portable. Capacities: roller chain model—¾ to 15 tons; link chain model—¾ to 3 tons.

SPEED



Yale Rail King Tractor Trolley is motor-driven. Pulls any type of equipment for fast overhead handling. Capacities: ½ to 3 tons.

EFFICIENCY



Yale Plain and Geared Type Trolleys feature low headroom, low frictional loss, maximum flexibility for fast handling. Cap: ½ to 40 tons.

8 SOLID REASONS

WHY YALE CAN MEET YOUR LIFTING NEEDS

Will a single hoist do your job? Or do you need an integrated team? What jobs get done best with a hand hoist? Which require an electric? Is yours a trolley or stationary operation? Your Yale Hoist Distributor has the right answers.

Better still, he has the right *equipment*—a complete line of rugged, smooth-operating Yale Hoists and Trolleys. Each is engineered to provide yeoman service under tough conditions year after year.

More! You need never buy "blind". Yale's series of "Why" booklets show you the vitals of each Yale Hoist—through accurate cutaway drawings that take you inside the product. These booklets are yours for the asking. Just contact your Yale Hoist Distributor—listed in the yellow pages, or write The Yale & Towne Manufacturing Co., Phila., Pa., Dept. A474

YALE* *REG. U.S. PAT. OFF.

INDUSTRIAL LIFT TRUCKS AND HOISTS

YALE & TOWNE

GASOLINE, ELECTRIC, DIESEL & LP-GAS INDUSTRIAL LIFT TRUCKS • WORKSAVERS
WAREHOUSERS • HAND TRUCKS • HAND AND ELECTRIC HOISTS

YALE MATERIALS HANDLING DIVISION. THE YALE & TOWNE MANUFACTURING CO. MANUFACTURING PLANTS: PHILADELPHIA, PA.; SAN LEANDRO, CALIF.; FORREST CITY, ARK.

For more facts circle 644 on Reply Card

This New RIDGID 4P-J

is the only 2½" to 4" geared threader that's Jam-Proof

It's safe—can't jam and knock equipment around when you thread pipe by power drive. Automatically kicks out after standard thread is cut. Workholder sets to size *before* putting on pipe—other easier work features. See it at your Supply House!

The Ridge Tool Company
Elyria, Ohio, U.S.A.

For more facts circle 645 on Reply Card

PROPELLAIR®

...built to solve your "heavy duty" ventilating problems

...mount in any position

Heavy duty Propellair Type "CD" fans are designed for versatility and rugged duty. They can be mounted in side walls, roof ventilators, hoods, ducts and machinery in any position you require. They are ideal for "tough" ventilating jobs like removing heat, moisture, smoke and dust laden air. You get greater efficiency and quieter operation, because the exclusive venturi entrance ring prevents wasteful recirculation. The rigid, cast aluminum, precision balanced air-foil propeller runs quieter and retains its clean aerodynamic characteristics at all operating pressures. Powered by dependable Robbins & Myers Motors of any design you need, they are covered by a single name-plate guarantee. Available in sizes from 12" to 60" for from 1020 to 85000 CFM air delivery. Let Propellair engineers survey your needs and recommend the correct ventilating equipment.

WRITE FOR BULLETIN NO. 690-PE

R&M PROPELLAIR®

DIV. OF ROBBINS AND MYERS, INC.
SPRINGFIELD, OHIO

Certified Ratings AMCA

MOVING AIR IS OUR BUSINESS

For more facts circle 646 on Reply Card

FIRST CLASS
PERMIT No. 11
BARRINGTON, ILL.

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed in the United States

Postage will be paid by

PLANT ENGINEERING

308 East James St.

BARRINGTON, ILLINOIS

APRIL, 1958
This card good only until July 31, 1958

PLANT ENGINEERING

Please have manufacturers send without obligation information or bulletins indicated by numbers circled.

(Please print or typewrite)

Your Name..... Your Title .....

Your Company Name .....

Company Address..... City..... State.....

(Company name must be given. If you prefer delivery at home, also fill below)

Home Address..... City..... State.....

PRODUCTS

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	32	33	34	35
36	37	38	39	40	41	42
43	44	45	46	47	48	49
50	51	52	53	54	55	56
57	58	59	60	61	62	63
64	65	66	67	68	69	70
71	72	73	74	75	76	77
78	79	80	81	82	83	84
85	86	87	88	89	90	91

BULLETINS

101	102	103	104	105	106	107	108	109	
110	111	112	113	114	115	116	117	118	
119	120	121	122	123	124	125	126	127	
128	129	130	131	132	133	134	135	136	
137	138	139	140	141	142	143	144	145	
146	147	148	149	150	151	152	153	154	
155	156	157	158	159	160	161	162	163	
164	165	166	167	168	169	170	171	172	
173	174	175	176	177	178	179	180	181	
182	183	184	185	186	187	188	189	190	
191	192	193	194	195	196	197	198	199	
200	201	202	203	204	205	206	207	208	
209	210	211	212	213	214	215	216	217	

DATA FILE

301	302	303	304	305	306	307	308	309	310	311	312	313	314	315
316	317	318	319	320	321	322	323	324	325	326	327	328	329	330
331	332	333	334	335	336	337	338	339	340	341	342	343	344	345
346	347	348	349	350	351	352	353	354	355	356	357	358	359	360
361	362	363	364	365	366	367	368	369	370	371	372	373	374	375
376	377	378	379	380	381	382	383	384	385	386	387	388	389	390
391	392	393	394	395	396	397	398	399	400	401	402	403	404	405
406	407	408	409	410	411	412	413	414	415	416	417	418	419	420
421	422	423	424	425	426	427	428	429	430	431	432	433	434	435
436	437	438	439	440	441	442	443	444	445	446	447	448	449	450
451	452	453	454	455	456	457	458	459	460	461	462	463	464	465
466	467	468	469	470	471	472	473	474	475	476	477	478	479	480
481	482	483	484	485	486	487	488	489	490	491	492	493	494	495

ADVERTISED PRODUCTS, SERVICES

501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532
533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564
565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	893	594	595	596
597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628
629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660
661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692
693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724
725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756

Use this space to ask for tear sheets, other information wanted. .....

APRIL, 1958
This card good only until July 31, 1958

PLANT ENGINEERING

Please have manufacturers send without obligation information or bulletins indicated by numbers circled.

(Please print or typewrite)

Your Name..... Your Title.....

Your Company Name .....

Company Address..... City..... State.....

(Company name must be given. If you prefer delivery at home, also fill below)

Home Address..... City..... State.....

PRODUCTS

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	32	33	34	35
36	37	38	39	40	41	42
43	44	45	46	47	48	49
50	51	52	53	54	55	56
57	58	59	60	61	62	63
64	65	66	67	68	69	70
71	72	73	74	75	76	77
78	79	80	81	82	83	84
85	86	87	88	89	90	91

BULLETINS

101	102	103	104	105	106	107	108	109	
110	111	112	113	114	115	116	117	118	
119	120	121	122	123	124	125	126	127	
128	129	130	131	132	133	134	135	136	
137	138	139	140	141	142	143	144	145	
146	147	148	149	150	151	152	153	154	
155	156	157	158	159	160	161	162	163	
164	165	166	167	168	169	170	171	172	
173	174	175	176	177	178	179	180	181	
182	183	184	185	186	187	188	189	190	
191	192	193	194	195	196	197	198	199	
200	201	202	203	204	205	206	207	208	
209	210	211	212	213	214	215	216	217	

DATA FILE

301	302	303	304	305	306	307	308	309	310	311	312	313	314	315
316	317	318	319	320	321	322	323	324	325	326	327	328	329	330
331	332	333	334	335	336	337	338	339	340	341	342	343	344	345
346	347	348	349	350	351	352	353	354	355	356	357	358	359	360
361	362	363	364	365	366	367	368	369	370	371	372	373	374	375
376	377	378	379	380	381	382	383	384	385	386	387	388	389	390
391	392	393	394	395	396	397	398	399	400	401	402	403	404	405
406	407	408	409	410	411	412	413	414	415	416	417	418	419	420
421	422	423	424	425	426	427	428	429	430	431	432	433	434	435
436	437	438	439	440	441	442	443	444	445	446	447	448	449	450
451	452	453	454	455	456	457	458	459	460	461	462	463	464	465
466	467	468	469	470	471	472	473	474	475	476	477	478	479	480
481	482	483	484	485	486	487	488	489	490	491	492	493	494	495

ADVERTISED PRODUCTS, SERVICES

501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532
533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564
565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596
597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628
629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660
661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692
693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724
725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756

Use this space to ask for tear sheets, other information wanted. .....

.....

FIRST CLASS
PERMIT No. 11
BARRINGTON, ILL.

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed in the United States

Postage will be paid by

PLANT ENGINEERING
308 East James St.
BARRINGTON, ILLINOIS

BULLETINS

(Begins on page 21)

142 Medium Transformers — Bulletin GEA-6108B, 32 pp, offers detailed descriptions, ratings and characteristics, performance data, weights and dimensions, standard and optional accessories of company's RM (repetitive manufacture) medium transformers. Illustrated with photos, drawings, graphs, charts and tables, bulletin features transformers with RM-ASA ratings of 501-5000 kva, single phase, and 501-10,000 kva, three phase 69 kv and below, including oil-immersed and Pyranol filled and load-tap-changing transformers. General Electric Co.

143 Integral Distribution Center — Bulletin GEA-6619, 16 pp, contains complete data on company's dry-type integral distribution center for such applications as industrial plants and warehouses, commercial buildings, others. Tells how one-piece construction saves space, simplifies specifying, ordering, and installation. Model numbers, dimensions, and choice of incoming line components are given. General Electric Co.

144 High Voltage Cables—Bulletin RCD 701 describes Neoprene-sheathed high voltage power cables for 3- to 15-kv service. Company's ozone-resisting insulations are discussed. Also covered are advantages of Roprene sheathing; specifications; voltage ratings, scope of use. Insulation and sheath thicknesses, strandings and nominal overall diameter for ozone-resistant high voltage cables are tabulated. Rome Cable Corp.

145 Cable Buying Hints — In easy reading style, 20-pp pocket-size Bulletin 1117 stresses importance of examining all aspects of an installation to be sure of obtaining proper electric cable for the job. Includes check list of many technical points to be covered in specifying an electrical cable circuit. Also explains the part a cable manufacturer can and should play in assuring performance of cable purchased. The Okonite Co.

146 Cable Support Systems — This 60-pp loose-leaf catalog gives up-to-date information on company's cable support systems, including trough, ladder, channel, and Rak-it system supports and accessories. In addition to the galvanized steel line, this catalog presents aluminum trough, ladder and channel. Includes dimensional detail sheets of value in laying out a trough or ladder system. Generously illustrated and edge-indexed, this catalog is bound in a vinyl cover. It is available to qualified plant engineers, please state your job title when requesting it. T. J. Cope Div., Rome Cable Corp.

147 Electrical Connectors—Bulletin 1252-1, 62 pp, features detailed information on environment-resistant electrical connectors. Two major series of connectors are described, with specifications and selection data, photos, drawings and diagrams, included. A wide choice of pin and socket contact configurations and receptacle housings listed. The Pyle-National Co.

148 Electrical Contacts — Catalog C-520, 16 pp, describes properties and applications of company's line of electrical contacts. Discussed are contacts manufactured from fine silver, palladium and nickel, silver alloys as well as silver cadmium oxides and many powdered metal compositions designated as Gibsiloys. List of applications and materials is furnished. Gibson Electric Co.

149 Safety Switches—This bulletin illustrates and describes the uses and advantages of company's line of Isoline safety switches featuring total safety, maximum flexibility, wide capacity and interchangeability. Total safety operation is illustrated. Electric Distribution Products, Inc., Div. Worthington Corp.

LIGHTING, COMMUNICATION

150 Lighting Fixtures — Condensed information on company's lighting fixtures and lighting systems is provided in this 8-pp bulletin. Provides 56 illustrations and stresses design advantages and construction. Provides an over-all view of the variety of fixture designs, ranges of light output, and choice of mounting methods available. A page is devoted to wall-to-wall lighting systems, including a modular, interchangeable panel system. Sylvania Lighting Products, Inc.

151 Mercury Lamps — Eight-pp Bulletin LS-103 offers a comprehensive source of information on design and operating characteristics of mercury lamps and transformers, as well as the physical, electrical and output data on company's line. A table gives complete details for each lamp, from initial lumen output, through recommended burning position and price. Another section contains information on transformers used with mercury lamps and includes wiring diagrams. General Electric Co.

152 Mercury Floodlighting—Bulletin 640, 18 pp, contains latest information on operating characteristics and operating economies as well as color characteristics of company's mercury vapor lamps. In addition, there is a section on how to select ballasts with illustrations of the typical ballast types and mountings. Also contains layout diagrams and selection tables. The Pyle-National Co.

153 Emergency Lighting—Twenty-pp Publication 243A features emergency lighting systems for commercial, industrial and other types of buildings. In addition to describing the systems, catalog contains complete information and specifications on all components, fixtures and exit signs, as well as excerpts from NEC requirements. The Standard Electric Time Co.

154 Mobile Radio Systems — This fully illustrated case history brochure documents the speed, efficiency and economy of mobile radio systems operating in a broad range of industrial, utility, business, and professional service organizations. Also described and illustrated are various types of mobile radio and base-stations systems and equipment for service groups. Radio Corp. of America.

SAFETY, FIRE PROTECTION

155 Fire Protection Service—Form 5742 describes a "service plan" for fire fighting training and fire prevention planning. Describes such services available to users of company equipment as in-plant fire protection survey, visual aids for training meetings, fire control training and demonstrations, fire school for supervisory personnel. Ansul Chemical Co.

156 Safety Equipment—Catalog 57 is a 68-pp descriptive catalog of personnel safety equipment. Lens properties and materials and frame construction, sizing and fitting in addition to product descriptions showing individual components and parts are explained. Covers helmets, air analysis apparatus, air line accessories, caps, dust hoods, ear muffs, face shields, gas masks, goggles, hats, respirators, spectacles and other products. Willson Products Div., Ray-O-Vac Co.

Postage-free Reader Service Cards make it easy to order catalogs. Cards are provided on the facing page.

157 Using Sulfur Dioxide? — For plants in which SO_2 is used in manufacturing processes, this 16-pp booklet gives answers to questions frequently asked about this chemical. Gives physical and chemical properties, specifications and specification test methods, suggested uses, toxicity, shipping and handling. Ansul Chemical Co.

VALVES, FITTINGS

158 Bronze Valves—Described and illustrated in this bulletin are 150-lb WSP bronze, globe, angle and check valves. Bulletin contains service ratings, dimensional drawings for each type of valve and an exploded view of a globe valve with matching text for each component. Inventory and service advantages of interchangeability of parts detailed. Walworth Co.

159 Swing Check Valves—Bulletin 8K describes company's line of swing check valves designed for service in steam or water lines to protect against reverse flow. Included is detailed information on basic swing check valve and modifications. Sectional drawings show construction of each type of valve. Schutte and Koerting Co.

160 Diaphragm Control Valves — Specification S810-16 gives full details of construction on company's Series 800 three-way control valves, including both single and double-seated designs for mixing or diverting service. Includes sizes, materials, pressure ratings and cross-section drawings. Minneapolis-Honeywell Regulator Co.

161 Automatic Valves—Bulletin 7F features quick-reference data on pressure reducing and regulating valves and diaphragm operated control valves. Gives easy-to-use resume of seven different valves, including pressures, body materials, service and pipe sizes. A. W. Cash Valve Mfg. Corp.

BULLETINS

(Begins on page 21)

163 For Process Industries — Sixteen-pp Booklet TB-417 presents information on application of tubing, pipe and welding fittings for process industries. Gives points to consider in selection of materials, analysis, physical, mechanical and creep strength properties of various steels and case histories of cost saving applications of tubular products. Tubular Products Div., The Babcock & Wilcox Co.

165 Quick Coupler—Eight-pp Catalog F-10-R gives complete information on Kamlok quick couplers, used on hoses, piping, and equipment. Describes features, applications, materials, styles and sizes. Contains dimensional drawings, pressure-temperature ratings, and useful chemical service recommendation chart. Jordan Industrial Sales Div., OPW Corp.

166 Welding Fittings, Flanges — Bulletin FB-503 is designed as a guide to buying welding fittings and flanges. Explains how to go about specifying the welding fittings and flanges required. The Tubular Products Div., The Babcock & Wilcox Co.

WATER TREATING

168 Zeolite Softeners — Bulletin 5763, 12 pp, describes advantages of company's zeolite water softeners. Design and construction features are detailed and selection data presented in a series of charts. A line of regeneration equipment for zeolite softeners is also described. Photos and schematic diagrams included. General Filter Co.

169 Corrosion Inhibitor — Bulletin 420-12-19 describes Composition TG, a sodium-zinc hexametaphosphate corrosion inhibitor for water systems, stressing its superiority in controlling corrosion in water mains and cooling equipment. Provides comparative graphs showing flow coefficients, rate of film formation as determined by weight loss and current flow, and schematic drawings of feeding methods. Calgon Co., Hagan Chemicals & Controls, Inc.

170 Rust, Corrosion Treatment—A treatment for rust and corrosion in steam lines, return lines, radiators and steam heated processing equipment is described in Bulletin MA. Causes of rust and corrosion and action of the water treatment are explained. The North American Mogul Products Co.

MACHINE SHOP AND METAL FINISHING

171 Abrasive Belt Grinding—This 24-pp booklet contains some 30 case histories on abrasive belt machine applications. On-the-job data includes production figures, type of belts used, belt life, fixturing, comparison with other methods, and stock removal, tolerance and finish specifications. Advantages of these grinders are shown, and their production versatility is illustrated by a variety of parts—forgings, castings, stampings, extrusions — with operating data on ferrous and nonferrous metals, plastics, other materials. Engelberg Huller Co.

172 Automatic Turret Lathes—Detailed information on company's automatic turret lathes with hydraulic drive feature is presented in 12-pp Form 1182-A. Operation details and important features are covered. Gisholt Machine Co.

173 Cut-Off Wheel Selection—This 32-pp booklet, newest in company's series on abrasive cut-off characteristics, deals with wheel selection. There are 29 illustrations of various kinds of cuts. Some of the limitations of the use of this process are also given, so as to show why it's not possible to get any one wheel suited for all kinds of jobs. Booklet is available to qualified plant engineers. Wallace Supplies Mfg. Co.

174 For Blast Cleaning—Catalog 951-D, 32 pp, covers company's airless blast cleaning machines as well as wet blast, air blast and dust control equipment. Also included are cast steel shot and grit abrasives, sandcutters and core rod straighteners. Listed for the first time are Super Tumblasts, heavy duty, high efficiency batch-type centrifugal blast cleaners. Wheelabrator Corp.

175 Gas Welding Equipment—The 36-pp 1958 Welding Equipment Catalog (No. 160) covers recommended applications of company's complete line of oxy-acetylene welding and cutting torches, air-acetylene torches, machine cutting torches, welding regulators, industrial regulators, pressure gages, tank couplings, adapters, hose connections and safety instruction manual. Modern Engineering Co., Inc.

176 On Electrode Selection—How to select most efficient electrode for any welding job is covered in the 12-pp Weldirectory. Describes basic characteristics of each family of electrodes, including deposition, arc action, amount of slag, bead appearance. Differentiates between individual electrodes within the family and gives physical properties, current ranges, sizes. The Lincoln Electric Co.

177 Big, Little Bends—For those interested in bending of pipe, tubing or structural shapes, this 36-pp brochure illustrates the various types of bending and their applications. Utilizes in-plant pictures to show rotary, ram and roll bending and the equipment used for each. Wallace Supplies Mfg. Co.

178 Finishing Systems — Eight-pp Bulletin 600 describes company's line of finishing equipment. Complete systems are explained and many isometric drawings of different types of finishing equipment are included. Schmieg Industries, Inc.

179 Blast Cleaning Ideas—Catalog 143-D, 28 pp, is a handbook of blast cleaning, finishing and shot peening ideas utilizing airless abrasive blast method. A section is devoted to versatility of applications of company's airless blast equipment in which more than 50 case histories are included. Rest of booklet is devoted to specific types of blast cleaning machines, describing their applications, features and specifications. Wheelabrator Corp.

180 Handy Little Brushes—This 8-pp bulletin describes Situft and Helituf brushes for efficient and economical cleaning and deburring jobs—particularly those little jobs that are difficult and time consuming. Gives characteristics, specifications and job applications. The Osborn Mfg. Co.

181 Vibration Control — Bulletin VC-501 describes Vibracork, a vibration, shock and noise controlling material recommended for massive, difficult to isolate machinery. Physical properties and application steps are described. The Korfund Co., Inc.

183 For Coolant Cleaning — Automatic equipment for continuous cleaning of coolants and cutting oils is the subject of this bulletin. The "why" of coolant cleaning is discussed in detail and important operating and maintenance benefits listed. Production-line applications for coolant separators and filters are also given. Infilco Inc.

INSTRUMENTS, CONTROLS

185 Automatic Controls — Catalog 858, 60 pp, features automatic controls for pressure, temperature, liquid level and mechanical movement. Profusely illustrated with photos, drawings and diagrams, the catalog also presents data on relays and both magnetic and tilting type mercury switches. Tabulated engineering data are included, as well as detailed ordering and application information. The Mercoid Corp.

187 Metering, Control Systems — Bulletin 500 describes the purpose, design and operation of company's metering and control systems. A discussion of pneumatic and electric telemetering, and pneumatic control is included, along with detailed literature references for all products making up these systems. Bailey Meter Co.

188 Flow Meters—Features and applications of company's Series 500 flow meters for recording, integrating, indicating and automatic controlling are explained in 40-pp Bulletin F1605. Includes information on mechanical and electric flow meters, flow meter charts, meter bodies, primary devices for flow measurement, electric flow meter transmitters and receiving instruments, receivers for remote measurement of flow, others. The Bristol Co.

190 Flow Tubes—Twenty-pp Technical Bulletin 115-L3C gives comprehensive technical data on the design, metering characteristics, flow formulae, the capacity and accuracy, installation information, accessory items, and similar engineering information on the Dall Flow Tube. It is illustrated with photos, sketches, charts, and graphs of interest to plant engineers concerned with technical aspects of this low head-loss differential producer. Builders-Providence, Inc., Div. of B-I-F Industries, Inc.

192 Eyes of Automation—This 24-pp booklet contains illustrations, descriptions, application diagrams and

102,000 lbs. of steel was unloaded, sorted and stockpiled in one hour with the help of this American 300 Series Self Propelled Crane. A complete line of American Cranes and Excavators provide fast, maneuverable, versatile materials handling equipment for every application.

Working a clamshell bucket is just one of many jobs American DiesELectric Locomotive Cranes handle with cost-saving efficiency. This self contained crane will also work with hook, magnet, orange peel or grapple fronts —has ample power to switch railroad cars, too!

TRIGGER FAST AIR CONTROLS BOOST CRANE'S OUTPUT 20%

Fast, highly responsive air controls actually increase the daily production output of big American DiesELectric* Locomotive Cranes by 20%! Leading firms in the country's heavy industries have swung to American for their volume materials handling jobs. These cost-conscious firms have learned that the American's patented diesel-electric power system cuts operating costs sharply. Electrically driven trucks provide smooth switching and car spotting power while reducing maintenance costs up to 50%! Dependable diesel power on the machinery deck results in low cost materials handling power.

A variety of fronts . . . hook, clamshell, magnet, orange peel or grapple . . . provides every industry with a versatile, heavy duty, high production machine that will pay for itself in a hurry.

If you're interested in boosting handling volume while trimming costs, investigate American's new concept in crane design—the DiesELectric Locomotive Crane! Specifications on this complete line offering capacities from 25 to 130 tons are available immediately by writing:

*trademark

EXCAVATORS-CRANES to 2 yds.-50 tons
LOCOMOTIVE CRANES to 130 tons
DERRICKS-HOISTS to 800 tons
REVOLVER CRANES to 400 tons

AMERICAN HOIST
and Derrick Company
St. Paul 7, Minnesota

AMERICAN HOIST PACIFIC COMPANY
Special materials handling equipment

CROSBY-LAUGHLIN DIVISION
Drop forged fittings for wire rope-chain

A limited number of locomotive cranes available for rental service

For more facts circle 647 on Reply Card

BULLETINS

(Begins on page 21)

data on photoelectric controls. Covers normal, high speed, ultra sensitive and impulse actuated photoelectric controls, plug-in mounted units, photoelectric timing controls, dual function units, others. Autotron, Inc.

193 Pyrometer Supplies — Catalog G-100-8, 54 pp, describes thermocouple assemblies and components for measuring temperature. Design and construction features are covered and general information on thermocouple theory and practice given. The catalog contains thermocouple selection data, tables giving suggested protecting tube or well materials for common applications, thermocouple accuracies, chemical and electrical data, dimensions. Industrial Div., Minneapolis-Honeywell Regulator Co.

OTHER EQUIPMENT

194 Packings, Gaskets, Seals—Bulletin AD-162 is a 12-pp packing handbook detailing packings, gaskets and seals and their materials of construction and uses. Contains table listing effect of numerous gases, liquids and solvents on packing materials from metals to synthetics to leather. Booklet is divided into three sections, the first dealing with static sealing. Another section covers dynamic sealing, a third outlines Teflon and Kel-F materials. The Garlock Packing Co.

195 Optical Projectors—This 16-pp booklet describes features of Kodak contour projectors and details various applications for optical gaging in the toolroom, on the production line, etc. Provides specifications chart listing features of individual contour projectors, such as clear screen diameter, real field diameter, throat clearance, workable capacity. Eastman Kodak Co.

196 Tubes and Plates—Publication B-2, 46 pp, covers the subject of tubes and plates for condensers and heat exchangers. Fields of application and particular problems encountered in each are described. Information on condenser tube alloys, plates for tube sheets and baffles, manufacturing methods, installation, operational factors affecting tube life, corrosion factors in condenser tube service is presented. The American Brass Co.

197 On Roller Mills—Thirty-pp Catalog 63 covers company's semi-fine and fine pulverizing screen and pneumatic roller mills. Contains detailed drawings, specifications, capacities, construction and maintenance facts on both the screen-type and pneumatic mills. Bradley Pulverizer Co.

198 Drafting Templates — Sixteen-pp Catalog 60 carries photos and description of the various types of templates made by the company. An index lists templates by number and by category, including electrical templates, ellipses, mechanical engineering templates, general templates, architectural templates, processing, miscellaneous specialized templates. Rapidesign, Inc.

DATA FILE of literature for the plant engineer's library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these catalogs, circle item numbers of those wanted on postage-free cards provided for you on pages 217-218.

PUMPS, COMPRESSORS

301 Circulating Pump—Bulletin 1A-856 details seven advantages of company's Booster circulating pumps, and includes complete design and performance data. Capacity chart and specifications included. Bell & Gossett Co.

302 General Purpose Pumps—Section B, 36 pp, describes rotary pumps for general purpose use. Explains positive displacement principle incorporated, gives suggestions for selecting proper materials of construction. Application and ordering information is provided on mounted and unmounted small pumps, large mounted pumps, pumps for operations requiring greater sealing, and large, totally enclosed models. Viking Pump Co.

303 Solids Handling—Bulletin 121-A, 8 pp, describes non-clog pumps for handling solids in suspension. Included are vertical, horizontal and close-coupled types used to handle liquid components of industrial processes, industrial waste, and for such pumping applications as water supply, drainage and sewage handling. Specifications are included. Aurora Pump Div., The New York Air Brake Co.

304 Continuous Flow Pump—Bulletin 30-C, 8 pp, outlines advantages of company's Moyno pumps which handle a variety of materials—from free-flowing liquids to non-pourable pastes, abrasives, solids. Describes principle of operation, discusses performance, construction, capacities, and includes specifications. Robbins & Myers, Inc.

305 Sewage Pumps—Twelve-pp Bulletin 7500 illustrates heavy-duty wet and dry pit sewage pumps, small vertical sewage pumps and standard and submersible cellar drainers. Includes performance tables for selecting pumps, dimensional drawings and details of construction. The Deming Co.

306 For Abusive Pumping Jobs—Catalog 4906, 36 pp, covers centrifugal pumps for wide industrial use and especially adapted to handling ashes, abrasive mixtures, slurries, hot and corrosive liquids. It describes several basic types; a horizontal shaft, single-stage side suction pump; a horizontal shaft, single-stage, rear-entrance automatic priming pump; vertical shaft pumps with standard, overhead and quill bearings for wet pit applications. Nagle Pumps.

307 Condensed Pump Data—Form 4383-J covers more than 20 types of general service pumps, rotary pumps, sump and drainage pumps, condensate unit, self-priming units, stainless steel pumps and high-pressure pumps. In easy-to-find tabular form, each model is pictured along with its characteristics, features. Goulds Pumps, Inc.

309 Industrial Air Compressors—Advantages of company's line of industrial air compressors are detailed in 16-pp Catalog 5510. Tables indicating weights, code words and dimensions are included, as well as cutaway views showing design and operation details. Compressor specifications are given, and dimensional diagrams and other material included. Schramm, Inc.

312 Air Cooled Compressors—Bulletin AC-15, 16 pp, shows a complete line of small, air-cooled compressors for industrial, and other use. Both one- and two-stage compressors are covered, with working pressures ranging from 85 to 175 psi. Complete specifications for each model are provided. Gardner-Denver Co.

313 High Pressure Compressors—Bulletin A-93, 8 pp, describes company's high pressure compressors for soot blowing, chemical processing, gas compression and other high pressure needs. A cutaway view illustrates component features. Joy Mfg. Co.

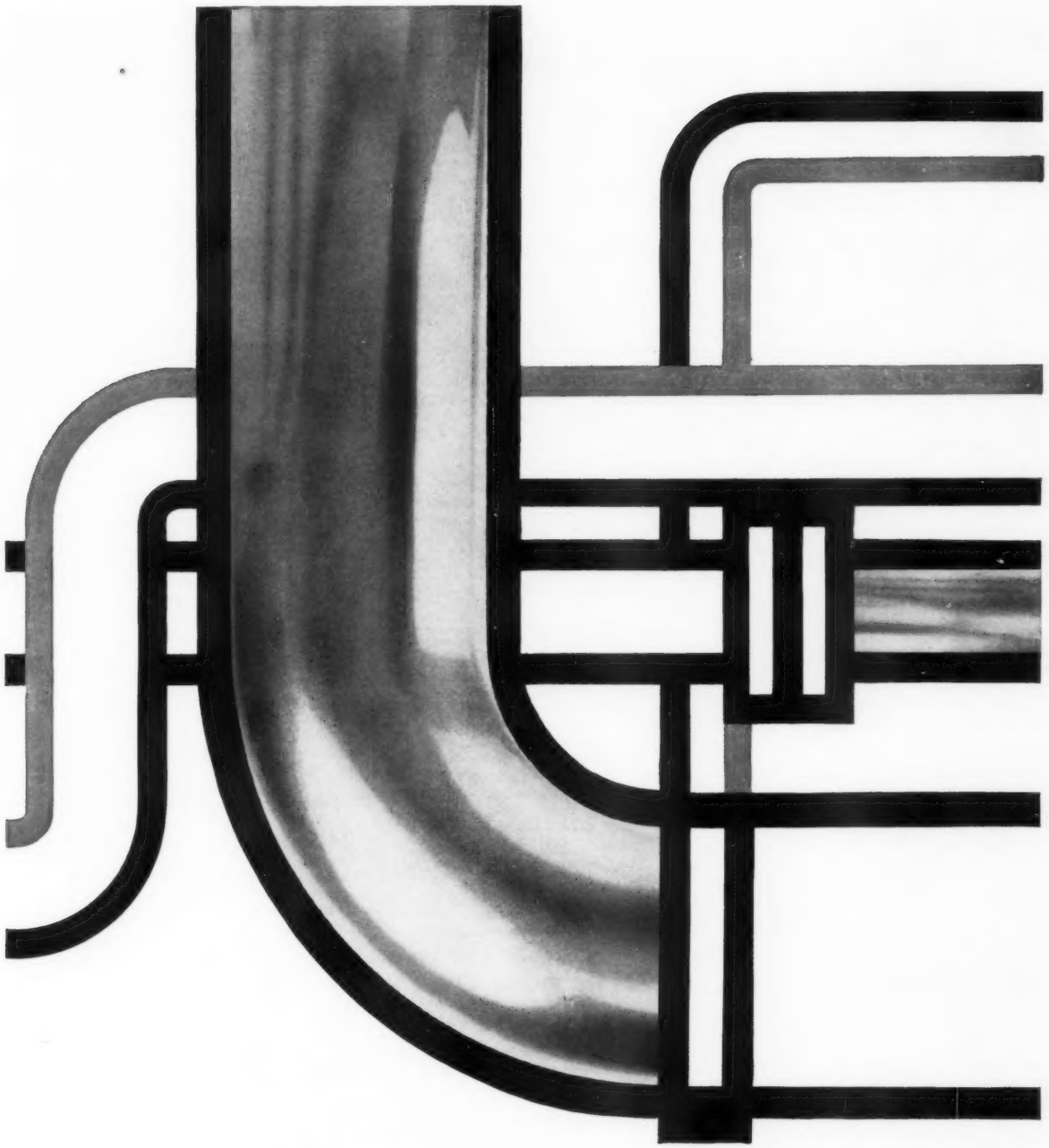
PACKINGS, SEALS

314 Braided Packing—Form AD-131, 8 pp, describes lattice braid packings designed for longer service life and lower maintenance. A table of general recommendations gives essential data, and a table of lengths and weights is included. The Garlock Packing Co.

315 Sealing Compounds—Twelve-pp Bulletin 7009 describes Titeseal, a group of sealing compounds, each designed for a specific purpose. Tells where Titeseal is used, how it is used, and how it acts to stop leaks and waste and prevent seizure of parts by rust and corrosion. Describes basic Titeseal blends. Radiator Specialty Co.

316 Piston Packing—Sixteen-pp Bulletin 5503 presents engineering data on Darcova Pumcups for packing pistons of air cylinders, hydraulic cylinders and reciprocating pumps. Included are operating diagrams and a list of typical installations, as well as helpful data on Pumcup compositions, textures and types made available for specified pressure, temperature and corrosive conditions. Proper compositions are identified for various gases, acids etc. Darling Valve & Mfg. Co.

317 Mechanical Seal—Bulletin CP-551 features a mechanical seal designed for complete interchangeability with packing in stuffing boxes of pumps and other rotating processing equipment. Cutaway drawings and an installation diagram are included. Chemical and Power Products, Inc.



win the fight against corrosion—with Alcoa Aluminum

For over 30 years, Alcoa development engineers have successfully employed the outstanding corrosion resistance of aluminum to solve corrosion problems in the process industries. Their unparalleled knowledge of aluminum's behavior in corrosive situations can furnish proved solutions to your most serious corrosion problems. Let Alcoa show you how to *win the fight against corrosion—with Alcoa® Aluminum.* You'll get these extra benefits, too: Light weight • Good workability Low cost • High thermal and electrical conductivity • Great strength in alloys • Non-sparking characteristics • Non-toxicity • Good reflectivity • Clean, attractive appearance.

For immediate help, outline your corrosion problems in a letter to ALUMINUM COMPANY OF AMERICA, 889-D Alcoa Building, Pittsburgh 19, Pennsylvania.

"ALCOA THEATRE"
Exciting Adventure
Alternate Monday Evenings

ALCOA ALUMINUM
ALUMINUM COMPANY OF AMERICA

Specify Alcoa Aluminum for
corrosion-free Process Equipment
Pipe & Tube
Tanks, Containers, Trucks & Cars
Plant Structures

For more facts circle 648 on Reply Card

DATA FILE

(Begins on page 222)

318 Rotary Seal Data—Plant engineers concerned with process equipment will find it easy to select the right type of mechanical seal for a specific operating condition with Form 480, a 16-pp catalog on rotary mechanical seals. It is extensively illustrated with cutaway views showing stuffing box installation details. Each seal is attended by a quick reference covering temperatures, pressures and fluids it is designed to serve. Durametallic Corp.

TOOLS, WELDING AND MACHINE SHOP EQUIPMENT

320 Portable Tools—Industrial construction and other portable power tools for the manufacturing, construction, woodworking and metal-working industries are described in this 50-pp catalog. Tools appear in logical sequence of size and duty rating. Specification tables at bottom of each page permit easy selection. Skil Corp.

321 Portable Electric Tools — This standard catalog, Form 10, 24 pp, features portable electric tools, including electric drills, bench-drill stands, hole saws, buffing and polishing kits, sanders, polishers, grinders, hammers, saw blades, vacuum cleaners and others. The Black & Decker Mfg. Co.

322 Handy Fastening Tool — Two booklets show different ways in which this fastening tool can be used. One booklet shows how the tool can be used for plant maintenance—fastening conduits, bus ducts, junction and outlet boxes, surface raceways, fixtures and frames, duct straps, fan and blower mounts, sprinkler pipes, partition plates. The second booklet tells how it is used in lead lining. Ramset Div., Olin Mathieson Chemical Corp.

323 Where to Use Your Stud Driver—Twenty-pp pocket-size Form 955 describes and pictures applications of studs, using company's Model 450 stud driver. Provides some operating hints and safety precautions and covers use of studs through steel into concrete, wood into concrete, wood into steel and steel into steel, as well as their use for attachment of pre-drilled fixtures. Remington Arms Co., Inc.

324 Pipe Tools—Ordering and application information on Ridgid pipe tools is provided in 16-pp illustrated Catalog 7596R-5. Wrenches, cutters, threaders, reamers, vises, and others are pictured and described, also power drives, pipe and bolt threading machines, oilers. Capacity, price data included. The Ridge Tool Co.

325 Masonry Bits—Catalog MBC-56 describes carbide-tipped masonry bits for drilling holes in tile, brick, concrete, granite or any other kind of masonry. Specifications are included, as well as a table giving chuck and shank requirements to adapt to different electric or pneumatic hammers. New England Carbide Tool Co., Inc.

326 Data for the Shop—"Fluids and Facts for Metal Working" is a pocket-size booklet of about 44 pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. A section on metal working facts gives conversion tables, steel numbering systems, machinability ratings of metals. Standard Oil Co. (Ind.)

CONSTRUCTION

327 Aluminum Building Products — Form AD 285 is a 32-p catalog covering company's line of aluminum industrial building products. Cites advantages of aluminum, pictures some installations. Installation data, weights, dimensions and roughing-in details are provided on corrugated roofing and siding, V-beam roofing and siding, ribbed siding sheet, perforated corrugated sheet, flat flashing sheet. Aluminum Co. of America.

330 Panel Wall Construction — The advantages of company's M-Type Q-Panel walls are outlined in 12-pp Bulletin Q35-55. Includes installation photos, diagrams, specifications, as well as drawings pointing out structural details. H. H. Robertson Co.

332 Functional Glass — Advantages of company's rolled, figured and wired glass for vertical sidewall and skylight glazing are detailed in Catalog 58-G, 20 pp. Describes types suited for commercial, institutional, industrial applications. Provides transmission data, light distribution properties, photos of patterns. Sections are devoted to types primarily for decoration, for protection, for heat absorption. Mississippi Glass Co.

334 Steel Floor Plate — Skid resistance and other advantages of USS multigrip rolled steel floor plate are stressed in this illustrated bulletin. Also gives dimensions, data on allowable loads. United States Steel Corp.

335 Non-Slip Flooring — Algrip, an abrasive rolled steel floor plate described as non-slip even on steep inclines, is the subject of Booklet AL-29, 8 pp. Discusses safety features, and includes information on fabricating. Alan Wood Steel Co.

336 Structural Clay Products—Illustrated in color, 24-pp Catalog S-58 details characteristics and applications of structural clay products. Various types of facing tile and brick for interior and exterior walls, as well as floors, are shown. Patio tile, stairtread tile, flue lining, drain tile, sewer pipe and fittings and others are also covered. Photos of applications in industrial buildings, power plants, institutions are provided. Natco Corp.

SLINGS, CHAINS, WIRE ROPE AND FITTINGS

338 Wire Rope Manual—"Inspection of Wire Rope," "Methods of Lubricating Wire Rope," "Use and Abuse of Wire Rope," and "Sheave Maintenance" are a few of many subjects covered in this 188-pp Wire Rope Manual, Catalog G-16. In addition, there are sections devoted to strengths and weights of wire rope, cable assemblies, and rated capacity of slings. A complete reference guide on care and use of wire rope and slings, Manual is in handbook size and tab indexed. Available to qualified plant engineers, please state your job title when requesting this. Macwhyte Co.

340 Drop Forged Fittings—Comprehensive data on company's line of drop forged fittings for wire rope and chain are presented in 40-pp Catalog 950-2. Includes specifications, dimensions, rated capacities and weights. Also announces range of sizes and capacities in many of items listed, as well as new products, including wire rope clips, chain links, clevis links, weldless sling and end links, swivels, shackles, hooks, cargo handling hooks, turnbuckles, others. Crosby-Laughlin Div., American Hoist and Derrick Co.

341 Sling Chain Handbook—Illustrated Data Book 100, 32 pp, presents "how to do it" information on sling chains—from ordering to care, use and inspection. Contains diagrams, charts and tables on standard and special styles of sling chains and attachments, and their sizes, weights and working load limits under many conditions. Columbus McKinnon Chain Corp.

DUST CONTROL

342 Industrial Dust Control—A wide variety of collection methods for industrial dust control is described in 16-pp Bulletin 922. A typical case history is included, as well as photos, cutaway views, drawings and capacity data on the various units. Pangborn Corp.

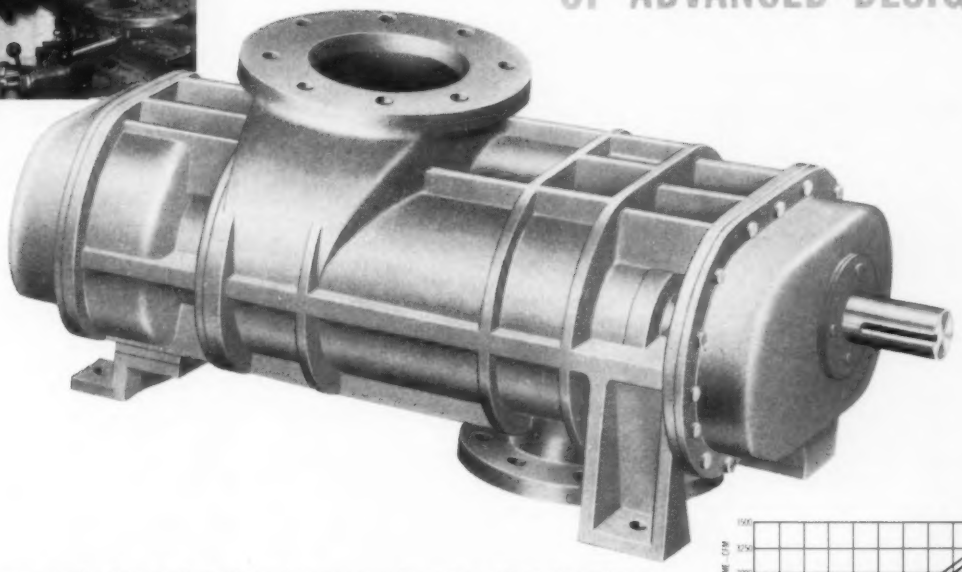
343 For Dust Collection—A collection of product sheets providing application suggestions and specifications on Dustkop equipment designed to solve a wide range of dust handling problems is provided in the Series 700 bulletins. Various models are described and typical installations illustrated. Aget Mfg. Co.

345 Dust Collectors — Operation, construction, versatility and maintenance of company's unit dust collectors are explained in this bulletin. Includes sizes. The Kirk & Blum Mfg. Co.

347 For Wet Type Collectors—Hard deposits, congestion and corrosion greatly decrease the efficiency of wet-type dust collectors and necessitate frequent clean-outs. Bulletin WDC shows how proper water treatment will reduce these faults and promote peak efficiency. The North American Mogul Products Co.

348 Industrial Dust Control—Bulletin 104, 36 pp, on company's dust filters, gives detailed information about dust control systems and how to engineer them. Includes description of the Roll-Clean Dynaclone dust filter, as well as information, capacities and dimensions for other Dynaclone and automatic continuous dust filters, intermittent filters, and unit and economy filters. Also provides dust filter and dust control system specifications. The W. W. Sly Mfg. Co.

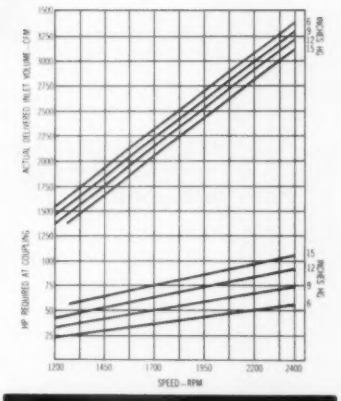
U.S.HOFFMAN ANTICIPATES INDUSTRY'S NEEDS WITH NEW CYCLOBLOWER OF ADVANCED DESIGN!



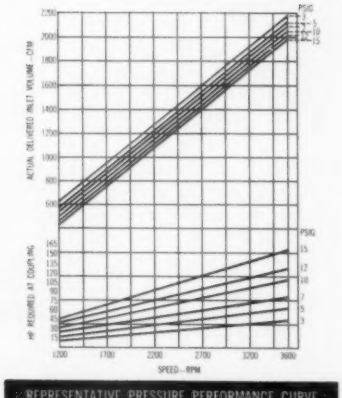
After years of advanced engineering research and on-the-job performance tests, CycloBlower, a new axial flow positive displacement blower or exhauster has been added to U.S.Hoffman's equipment line in keeping with the company's policy of anticipating industry's needs.

Operating on the principle of interruption of rotor seal continuity without sacrificing the benefits of perfectly symmetrical rotor forms, the CycloBlower offers numerous advantages over other blowers or exhausters including:

1 **Elimination of runout or trapped pocket effect**
2 **Clean air or gas delivery**
3 **Efficient, shock-free compression**
4 **High capacity—low unit weight**
5 **Installation flexibility**
6 **Efficient, dependable operation**



REPRESENTATIVE VACUUM PERFORMANCE CURVE



REPRESENTATIVE PRESSURE PERFORMANCE CURVE

HOFFMAN CYCLOBLOWERS . . . for tough service demands

Hoffman air appliance engineers will be glad to make a survey of your blower-exhauster needs. No obligation, of course. Write for information.

AIR APPLIANCE DIVISION

U.S.HOFFMAN MACHINERY CORP.

103 FOURTH AVENUE, NEW YORK 3, N. Y.

For more facts circle 649 on Reply Card

Let the BIT DO THE WORK!
Switch from Steel Star Drills to...
NEW ENGLAND
Cyclo-twist®
Rotary Carbide-Tipped
MASONRY BITS

Drill more holes with less effort and at less cost. The "reasons why" are in this combination of features found only in N. E. Carbide Bits.

Ground Cutting Edges
No Carbide Hang-over
Carbide Tip is Copper Brazed for Longer Bit Life
Spiral Flutes Assure Positive Dust Removal from Cutting Zone
Heat-Treated, High-Quality Alloy Steel
SIZES: 7/64" to 1½" diameter. Extra lengths up to 36".

SEND COUPON BELOW FOR FULL DETAILS

Other New England Carbide-Tipped Bits Include:

Cyclo-Core®
Multi-Tipped Bits for rotary drilling of hard masonry

Thunder-twist®
Bits for one-man hammer-drilling in any masonry from brick to granite

NE NEW ENGLAND CARBIDE
Designed, Engineered, and Proven for the Job. COPIED, BUT NEVER EQUALED!

GET FREE DRILLING MANUAL

NEW ENGLAND
Carbide Tool Co.,
55 B Commercial St.
Medford 55, Mass.
Please send me a copy of the "WHAT and HOW" Masonry Drilling Manual.
Name.....
Address.....
City.....State.....

For more facts circle 650 on Reply Card

DATA FILE

(Begins on page 222)

LUBRICATION

350 For Better Lubrication—Advantages of company's lubricants which are specially compounded for lubrication of reduction gear drives are outlined in pocket-sized folder. Features which assure smooth, trouble-free gear drive performance and lower maintenance costs are listed. Gulf Oil Corp.

351 Lubricant Data Book—Sixteen-pp Lubriplate Data Book No. 57-1, offers practical information on lubrication of machinery. Gives product data on grease type and fluid products, hydraulic oil, compressor oil, motor oil. Suggestions on applying lubricants under various conditions given. Lubriplate Div., Fiske Bros. Refining Co.

352 General Lubricant—Technical Bulletin 17 describes an industrial lubricant suitable for lubricating plain bearings, antifriction bearings, linkages, slides, cams and gears. Performance data is given, along with graph showing minimum life expectancy of typical lubricating oils. Sun Oil Co.

VALVES, TRAPS, PIPING

353 Valve Performance Facts—Included in this 36-pp booklet are 32 case histories of cost-saving valve installations. Service applications covered include steam, oil, water, coating fluid, chlorine, phenol, pulp stock, vacuum, others. Crane Co.

354 Industrial Valves—Bulletin 507V illustrates and describes company's line of industrial valves for control of air, gas, liquids and solids. Features photos and descriptive detail on a variety of valves, including butterfly valves, wafer butterfly valves, slide valves, check valves. W. S. Rockwell Co.

355 PVC Valves, Fittings—This 16-pp bulletin describes polyvinyl chloride valves and fittings offering resistance to most salts, alkalis and acids. Bulletin provides application tables on performance of normal impact PVC valves and fittings for handling 315 fluids. Cutaway drawing and text detail design features. Walworth Co.

356 Corrosion Resistant Valves — Eight-pp Bulletin 8 provides engineering specifications and a discussion of the advantages of Aloyco 20 valves. Basic types and adaptable features of these corrosion resistant valves are presented. Includes data on corrosion tests on this metal with various concentrations of sulfuric acid. Alloy Steel Products Co.

357 Plug-Type Valves — Long-life features of company's stainless steel plug-type valves are stressed in 6-pp Form 202-A. Cutaway view illustrates important design and operation features. Jenkins Bros.

358 Lubricated Plug Valves—Catalog PV-4, 36 pp, shows in detail a line of iron and steel lubricated plug valves. Many illustrations of single, screwed and bolted gland type valves are shown, including photos, sectional and detailed drawings. Also included is physical data on dimensions, ratings. The Wm. Powell Co.

359 Valve Lubrication—This 19-by-24-in. chart contains maintenance and lubrication information for company's lubricated plug valves. Of heavy paper with metal edges, the chart features detailed exploded views of four types of valves and includes a table of recommended lubricants for oil, water, gas and chemical service. Meter and Valve Div., Rockwell Mfg. Co.

360 Impulse Steam Traps—Bulletin T-1742, 8 pp, describes how the impulse steam trap works and includes complete details on pressures and temperatures, materials, capacities, weights and dimensions. Photos are used to illustrate typical installations. Yarnall-Waring Co.

361 Steam Traps—Quick-Flex thermostatic steam traps for outdoor and non-freeze service are described in Bulletin 257. Itemizes typical uses for these traps. Specifications and capacities are given in tabular form, accompanied by dimensional drawings. A piping diagram shows recommended installation. The V. D. Anderson Co.

362 Pipe for Modern Buildings — This 16-pp booklet discusses wrought iron pipe for modern buildings. Identifies wrought iron pipe and describes composition and advantages. Included are sections on wrought iron's resistance to corrosion and fatigue stresses, weldability, forming and threading, as well as the application of protective coatings. A. M. Byers Co.

363 Swivel Joints—Catalog G-4, 32 pp, covers this manufacturer's line of ball-bearing swivel joints as well as other products, including loading racks, manifolding lines, all-metal hose. In addition to providing dimensional and operating data on products, booklet is well illustrated. Chiksan Co.

364 PVC Pipe, Fittings — Technical data and installation information on unplasticized polyvinyl chloride pipe are provided in this 24-pp booklet. Also gives specifications for threaded and socket types of PVC fittings, valves and flanges, of normal and high-impact material. Contains pressure-temperature charts. Tube Turns Plastics, Inc.

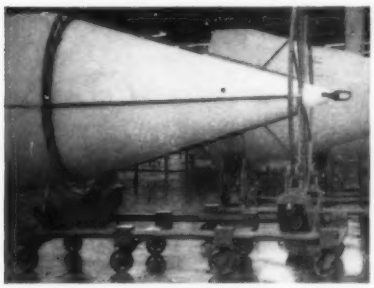
BOILERS, GENERATORS

365 Two-Drum Boilers — Bulletin SB-58, 12 pp, describes company's two-drum boilers, which provide high capacity in a compact design that saves space and lowers installation and maintenance costs. Delineates improved features and gives design, construction information. Erie City Iron Works.

366 Automatic Boilers—Bulletin BE-4 describes operation and advantages of manufacturers automatic boiler's spinning gas technique—a method of obtaining maximum heat transfer with a simplified design. Shows cutaway view of boiler construction. Boiler Engineering & Supply Co., Inc.

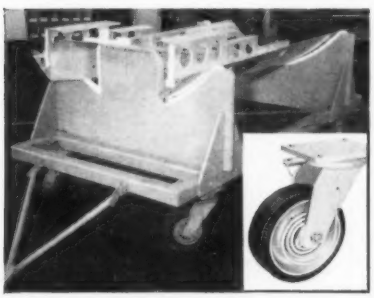
materials-handling news

NEW AND UNUSUAL APPLICATIONS OF BASSICK CASTERS THAT MIGHT BE ADAPTED TO YOUR HANDLING PROBLEMS



Redstone Missile rides Bassick casters on the ground. Grooved wheel caster construction permits close control of dolly. Second set of grooved wheel Bassicks permit missile to be rotated, facilitate fueling. Bassick casters are also used in handling The Nike.

Jet-age scaffold rolls to job on Bassick casters, stands steady, thanks to position locks, raises to convenient height for work. Here at Pease Air Force Base, New Hampshire, they're checking a jet engine. Could Bassick casters help speed work or save time in your plant?



Matador Dolly at The Martin Company's Baltimore plant has removable headers set up to transport Matador missile assembly. Bassick Floating Hub casters (inset) absorb shocks, snub out harmful vibration.

Bassick Casters help solve new plant problem

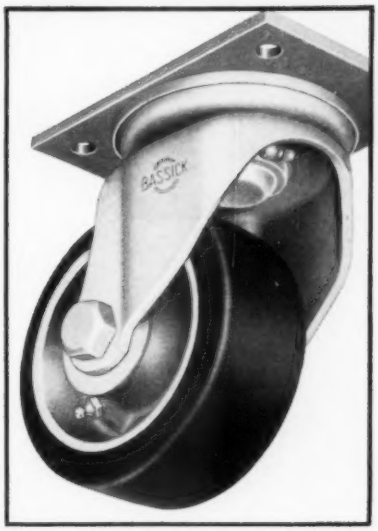
Decentralize for efficiency or centralize for savings . . . planned handling system lets Johnson & Johnson do both!

Johnson & Johnson's much-talked-about new plant at North Brunswick, New Jersey, is an exciting example of the savings possible with efficient materials-handling.

A 3600-ft. towline, with Bassick caster-equipped trucks, links all manufacturing operations to shipping, delivers raw materials and carries away finished products. In the shipping center, a clerk at control board (below) uses two additional 2000-ft. towlines to consign pallet loads to the 12-truck loading docks or storage. This well planned materials-handling system gives Johnson & Johnson the efficiency of decentralized management and production units plus the savings of centralized utility and services at the same time.

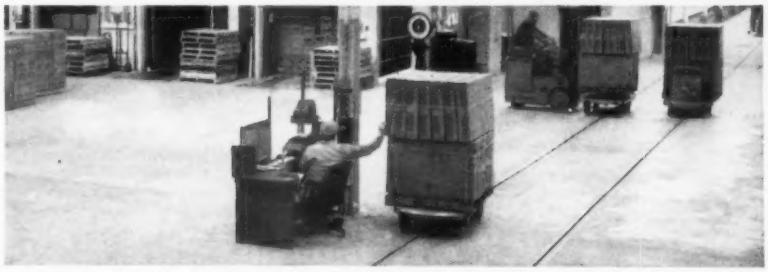
Trucks are equipped with 8" Bassick "S99" casters in front, and 12" Bassick "Alcore" wheels at rear. Sealed swivel and wheel bearings of casters minimize maintenance, assure long caster life, and keep floors clean of dripped lubrication grease which is both unsightly and hazardous.

Materials-handling, which represents 30% of the average manufacturer's production costs, is the one major cost area most capable of reduction. Could Bassick casters spearhead the attack on this "reducible 30%" in your plant, too?



Heavy duty Bassick "S99" casters have fully sealed bearings to keep grease in, dirt, water, debris out. They're built to stand the abuse of power pulled applications under heavy loads.

see our catalog in Sweet's or write for copy



YOUR DISTRIBUTOR SAVES YOU SPACE, TIME

Your local distributor who carries Bassick casters maintains sufficient stocks to meet most day-to-day needs—saves you storage space otherwise needed for supplies. He saves you ordering time, too, by acting as a single, dependable source of supply for a variety of products. Call on him.

Bassick SYMBOL OF EXCELLENCE

THE BASSICK COMPANY, Bridgeport 5, Conn. In Canada: Belleville, Ont. 8-39

For more facts circle 651 on Reply Card

HOW JOSEPH GODER INCINERATOR and "CINCINNATI GAS" Salvage 2000 lbs. of Copper Wire and Cable Per Hr.

At Hartwell Salvage Yard, Cincinnati Gas & Electric Co. installed a Joseph Goder Incinerator with automatic controls to maintain temperature and flame protection for thorough, "no odor" consumption of rubber coatings . . . for the profitable, fast salvage of wire and cable.

Especially designed with tandem charging doors for in-line batch charging direct from storage area.

A quick push starts 2000 lbs. of copper cable on its 1-hour salvage trip.

Bright, clean blaze strips coatings, leaves smokeless pile of copper salvage.

MAKE JOSEPH GODER YOUR INCINERATOR CONSULTANT

Over 45 years of know-how in solving every type of incinerator problem is at your service.

Offices in 55 Principal Cities

Ask for TECHNICAL BULLETINS on WET & DRY MATERIAL and other INDUSTRIAL WASTE INCINERATION

JOSEPH GODER INCINERATORS
4241 N. HONORE ST.
CHICAGO 13, ILL.

For more facts circle 652 on Reply Card

DATA FILE

(Begins on page 222)

367 Standard Generators — Bulletin B-55-4 describes company's SC economy series of standard steam generators designed to reduce steam costs for industrial plants. Pre-engineered, standardized steam generators offered in nine sizes with capacities of from 50,000 to 150,000 lb per hour are described, and schematic and cutaway drawings of the units and design features are included. Foster-Wheeler Corp.

368 Self-Contained Boilers — Bulletin AD-162, 8 pp, describes company's complete line of self-contained boilers for heating and processing steam or hot water. Design features and advantages are detailed and a cutaway view showing flow of air in the forced draft system is included. Cleaver-Brooks Co.

370 Package Boilers — This 12-pp booklet on package steam generators describes the formulas behind all package steam generators, and illustrates how installation of a package steam generator can raise steam capacity in an existing boiler room without extensive structural changes. Cyclotherm Div., National-U. S. Radiator Corp.

FILTERING

372 Data on Filters — Provided in this general catalog are product bulletins covering company's Staynew line of filters. These include intake filters, pipe line filters, liquid filters, hydraulic filters, automatic filters, dry panel filters, viscous panel filters, others. Catalog is available to qualified plant engineers. Dollinger Corp.

373 Filtration Equipment — Bulletin A-943 on industrial filtration equipment, covers company's Vacumatic filters, flotation equipment, Magnaflo separators for removal of ferrous solids, oil conditioner, cartridge filters, others. Includes application tips. U. S. Hoffman Machinery Corp.

374 Filters For Industry — This loose-leaf notebook contains a series of bulletins with detailed information and specification data on filters, aftercoolers and cyclone separators. Among those featured are Bulletin 117 on air filters, Bulletin 431 on filters for the chemical process industries, Bulletin 650 on general service filters and Bulletin 711 on cyclone separators and pipe line aftercoolers. R. P. Adams Co., Inc.

375 Filters, Strainers—Industrial Catalog 1054, 48 pp, provides application and engineering information on company's line of micro-filters and precision strainers. Fuel filters, full flow and by-pass lube filters, air separators, and metal edge strainers for fuel lube and industrial use are also presented. Purolator Products, Inc.

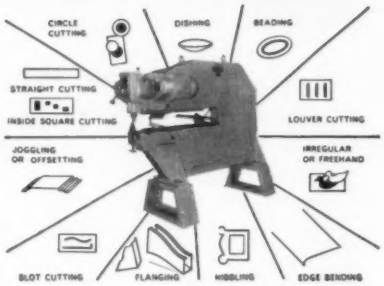
SPACE, PROCESS HEATING

377 On Unit Heaters—Latest improvements, specifications and performance data for Herman Nelson horizontal and vertical unit heaters are covered

A COMPLETE SHEET METAL SHOP IN ONE MACHINE

PULLMAX

DOES ALL OF THESE OPERATIONS



★ **CUTS MILD STEEL UP TO 11/32″**

The one machine that's sure to save time, labor and material when you work sheet or plate. Eliminates expensive die costs—easy to operate. 7 sizes to choose from.

Write for free catalog on Metalworking Ideas.

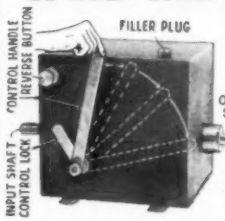
. . . or a demonstration right in your plant.

AMERICAN PULLMAX CO., INC.
945 W. Altgeld, Chicago 14, Ill.

For more facts circle 653 on Reply Card

• Original $200.00 Value •

1½ H.P. HYDRAULIC SPEED REDUCER



Max. Input 750 R.P.M.
Min. Output 0 R.P.M.
Item # 115

Control lever locks in position to give accurate, constant, speed.

- Reversible—complete control both directions
- Automatic overload protection
- Adjustable torque 100-180 in. lbs.

Compact 7″ x 8″ x 7″ Wght. 25 lbs.
Standard ⅝″ input & output shafts.

FOR: REAMER DRIVERS
CONVEYORS
MIDGET CARS
GARDEN TRACTORS

$72.50

F.O.B. CHICAGO—NOW ONLY

NEW SUMMER 1958 . . . HYDRAULIC CATALOG **FREE!**

FEATURING NEW AND SURPLUS

• Pumps • Valves • Cylinders • Accumulators, Hose, Gauges, Fittings, All at Bargain Prices. Immediate Delivery

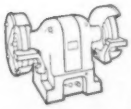
GROBAN SUPPLY CO., Dept. PE-4
1139 So. Wabash Ave.
CHICAGO 5, ILL.

For more facts circle 654 on Reply Card

3 ways to cut costs in grinding–

–all power-built by Black & Decker!

Whether you must take the work to the tool or bring the tool to the work, Black & Decker gives you a choice of grinders to save time and money.



Powerful B&D Bench Grinders save steps—speed up jobs when strategically located about your shop. Smooth running B&D motors give more constant speed, regardless of load. Four models: 6″ to 10″ sizes.

Precise light-weight B&D Die Grinders deliver top quality work at high speeds whether shaping, burring or grinding. Handle as easily as a pencil. Vibrationless—perfectly balanced from one end to the other. Smooth operation—perfect for carbide bit use. In sizes #8, #12, #20.

For more facts circle 655 on Reply Card

Time saving B&D Portable Grinders go to the work where surfaces must be prepared for welding and finishing. Perfect for smoothing welds, snagging and grinding castings and countless other grinding, cleaning and buffing jobs. 2½″, 5″ and 6″ sizes available.

See them today in your shop. Mail coupon for a free demonstration or more information.

Leading Distributors Everywhere Sell

Black & Decker®

Quality Electric Tools—Power-built to set the pace

MAIL TODAY FOR FREE DEMONSTRATION

THE BLACK & DECKER MFG. CO., Dept. 0804, Towson 4, Md.
(In Canada: Brockville, Ontario)

☐ Please arrange a demonstration of your ..... grinder. I am also interested in the tool(s) checked below.

☐ Please send additional literature.

Name..... Title.....

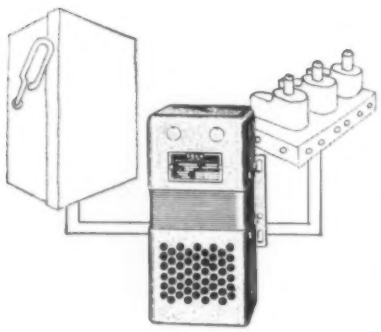
Company.....

Address.....

City..... Zone..... State.....

☐ Drills ☐ Scruguns® ☐ Magnetic Drill Presses ☐ Sanders

End your line voltage variation troubles



Do line voltage variations cause production or control troubles in your plant? If so, Sola Constant Voltage Transformers can be your simplest, most dependable solution. They are quickly and easily installed, simply by connecting them between the line and the device that needs the voltage stabilization.

These compact, reliable units provide voltage output regulated within ±1% with line voltage fluctuations as great as ±15%. Regulation is automatic and continuous. They are self-protecting against short circuits on output or load circuit.

Your maintenance man can install a Sola Constant Voltage Transformer in little time. He has no adjustments to make. There are no tubes, no moving or renewable parts. Once installed, these stabilizers need no further attention — as they do their dependable voltage regulating job around the clock.

Guard against lighting failures

Mercury lamp outages due to line voltage fluctuations can be avoided by using Sola Constant Wattage Mercury Lamp Transformers. For fluorescent lamps, Sola Constant Wattage Fluorescent Ballasts provide positive lamp starting.

These fluorescent and mercury lamp ballasts operate lamps at full rated light output, regardless of line voltage fluctuations. They provide cool, dependable, ballast performance.

For full information write for literature

Sola Electric Co., 4633 W. 16th St., Chicago 50, Ill.

SOLA

Constant Voltage Transformers
Regulated DC Power Supplies
Mercury Lamp Transformers
Fluorescent Lamp Ballasts

For more facts circle 656 on Reply Card

DATA FILE

(Begins on page 222)

in 36-pp Bulletin 700A. Includes complete hot water and steam performance tables, dimensions, selections, applications, descriptions of cabinets, elements, motor mountings, fans and accessories. American Air Filter Co., Inc.

378 Unit Heaters—Bulletin FAS-1, 24 pp, describes horizontal and vertical discharge unit heaters for replacing process exhausted air with warmed fresh air and for comfort ventilation. Dimensions, capacities, and suggested methods of installation are given, and photos, drawings and diagrams are included. L. J. Wing Mfg. Co.

381 Unit Heaters—Advantages of heating with Thermolier unit heaters are detailed in 21-pp Catalog uh-57. Features, types, selection, application and maintenance are covered and capacities, dimensions, wiring and piping diagrams, and sound ratings are included. Grinnell Co., Inc.

382 Electric Heating—Bulletin 975A, 12 pp, outlines advantages of electric heating and describes a number of different methods, such as radiant, convection, radiant and convection and forced hot air. Commercial and industrial applications are pictured, and specification and dimensional data included. Edwin L. Wiegand Co.

383 Industrial Heaters—Advantages and features of a line of industrial heaters for space heating, drying, make-up air and oven applications are detailed in this illustrated bulletin. A cutaway view points out essential design features, and tables of dimensional data and engineering data are included. Lennox Industries, Inc.

INSULATION

384 Insulation Specifications — This set of six specifications covers application of Foamglas insulation for industrial equipment and piping. Each booklet contains tables of suggested thicknesses of insulation to be applied, drawings of installation procedure, supports, and recommended finishes. Booklets are devoted to low-, medium-, high-, and dual-temperature equipment and piping, to underground piping, and spheres. Pittsburgh Corning Corp.

386 Glass Fiber Insulation—Among the company's products described in this illustrated bulletin are three kinds of flame-blown glass fiber insulations used for thermal and acoustical applications. Charts are included illustrating the acoustical and thermal values of the insulating blankets. L. O. F. Glass Fibers Co.

FANS, VENTILATING

387 Ventilation Units—Bulletin FM-315, 25 pp, describes basic construction of company's package propeller fans for commercial and industrial applications. Illustrated case histories of typical installations are included, as well as performance data, rating tables, performance charts. Buffalo Forge Co.

388 Air Engineering Equipment — Bulletin 106 contains detailed information on company's line of air engineering equipment, including various types of air conditioners, fan heaters, spray coolers, concentrator, spray deck coolers, condenser, fan cooler, liquid cooler. Niagara Blower Co.

389 Rotary Positive Blowers — Bulletin AF 154, 8 pp, contains selection tables, dimensions, illustrations and other descriptive material on a line of rotary positive displacement blowers. Advantages of the blowers are detailed. Roots-Connersville Blower, Div., Dresser Industries.

390 Standard Duty Fans — Designs and construction details of company's line of standard duty fans are covered in 28-pp Bulletin 543. Points out advantages, shows arrangement and application, describes accessories. The New York Blower Co.

391 Industrial Fans — Propellair Bulletin 650, 12 pp contains dimensions, application, and performance data on Tubeaxial and Stackbooster fans. Gives information on cooling and drying problems, system and open surface tank ventilation. Robbins & Myers, Inc.

392 Industrial Fans — Bulletin 702A features company's line of fan equipment for industrial air and material handling applications. Photos illustrate various types available, and complete descriptive detail and a table of general data are included. Clarage Fan Co.

for **leakproof, pressure-tight connections**

use **TiteSeal®**

SEALING COMPOUNDS

Heat and vibration-proof, non-solvent, will not shrink, crack or crumble. Makes all assemblies leak-proof and pressure-tight. Prevents rust, corrosion, joint seizure.

7 BASIC BLENDS

LIQUID WRENCH®

The super-penetrating rust solvent

LOOSENS

rusted bolts, nuts, screws, 'frozen' parts

Liquid Wrench works *fast*... yet is absolutely safe for all metals and alloys.

2171

At Industrial, Automotive, Hardware, Plumbing Jobbers

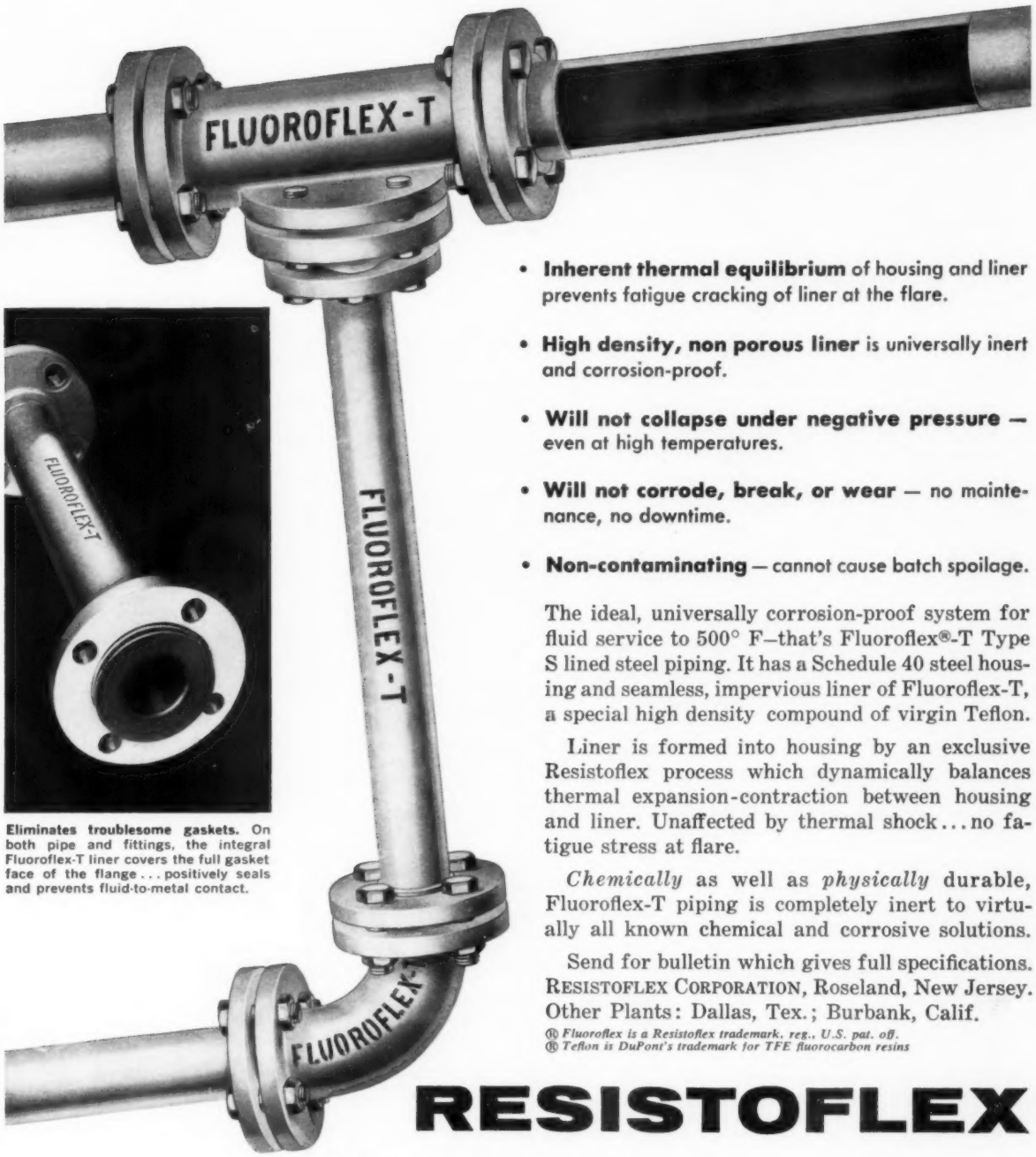
RADIATOR SPECIALTY CO.
Charlotte, North Carolina

SOLDER SEAL

For more facts circle 657 on Reply Card

Piping made permanent

...with Teflon® at its best



Eliminates troublesome gaskets. On both pipe and fittings, the integral Fluoroflex-T liner covers the full gasket face of the flange... positively seals and prevents fluid-to-metal contact.

- **Inherent thermal equilibrium** of housing and liner prevents fatigue cracking of liner at the flare.
- **High density, non porous liner** is universally inert and corrosion-proof.
- **Will not collapse under negative pressure** — even at high temperatures.
- **Will not corrode, break, or wear** — no maintenance, no downtime.
- **Non-contaminating** — cannot cause batch spoilage.

The ideal, universally corrosion-proof system for fluid service to 500° F—that's Fluoroflex®-T Type S lined steel piping. It has a Schedule 40 steel housing and seamless, impervious liner of Fluoroflex-T, a special high density compound of virgin Teflon.

Liner is formed into housing by an exclusive Resistoflex process which dynamically balances thermal expansion-contraction between housing and liner. Unaffected by thermal shock... no fatigue stress at flare.

Chemically as well as *physically* durable, Fluoroflex-T piping is completely inert to virtually all known chemical and corrosive solutions.

Send for bulletin which gives full specifications. RESISTOFLEX CORPORATION, Roseland, New Jersey. Other Plants: Dallas, Tex.; Burbank, Calif.

® Fluoroflex is a Resistoflex trademark, reg., U.S. pat. off.
® Teflon is DuPont's trademark for TFE fluorocarbon resins

RESISTOFLEX

Complete systems for corrosive service

LINED STEEL PIPE • FLANGED FLEXIBLE HOSE • BELLOWS • ELBOWS • TEES • REDUCERS • DIP PIPES & SPARGERS • LAMINATED PIPE

For more facts circle 658 on Reply Card

Problem solving at Huntington Laboratories

How red hands stopped infection from TNT

In a plant where TNT and tetryl are handled, workers developed skin infections and were sick from the poisonous effect of these chemicals. Absenteeism was high.

A Huntington representative suggested the problem be sent to the Huntington Laboratories. Result? An indicator liquid soap that turns red when TNT or tetryl is present on the skin. So now workers can be sure of getting all the chemicals off.

This is just one example of how Huntington helps industry solve problems. Do you have a sanitation or maintenance problem? We'd like to take a crack at it. We've had our fair share of successes in our 42 years.

Just call the Huntington representative nearest you, or write us direct.

Ask for the Man Behind the Drum . . . your Huntington representative.

HUNTINGTON LABORATORIES
INCORPORATED
Huntington, Indiana • Philadelphia 35 • Toronto 2

HUNTINGTON

. . . where research leads to better products

For more facts circle 659 on Reply Card

DATA FILE

(Begins on page 222)

393 Flexible Tubing — Spiratube A and R—flexible, lightweight, reinforced fabric duct designed for carrying air and other gases, many solids, and liquid at low pressure—are described in 8-pp Bulletin 10C-1. Applications are described, and performance data are included. Flexible Tubing Corp.

MAINTENANCE

395 Basic-Roofing Information "What You Should Know About Your Roof" is a 40-pp clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roofing practices, essentials of good re-roofing job. Johns-Manville.

396 Handbook on Coatings — This 1958 Coatings Manual is a 32-pp treatise highlighting the stopping and preventing of rust on nearly all types of rustable metal. Illustrated in full color, this book contains information and recommendations to enable accurate determination of specific coatings needed for the job. Basic principle of Rust-Oleum's fish oil penetration into pores of metal is illustrated. Application photos give new ideas for protecting girders, tanks, boilers, roofs, other surfaces. Contains 100 color chips. Rust-Oleum Corp.

397 Protective Coatings — Corrosion control in the operating plant is the subject of this bulletin, which outlines several corrosion-resistant coatings systems for buildings and equipment, structural steel, towers and columns, tanks and piping. Properties and uses are given. Amercoat Corp.

399 Repairing Concrete Floors — A seven-step procedure for repairing concrete floors with non-shrink mortar is described in this folder, EPMM-4. Each step is illustrated with an actual photo and description of step involved. The Master Builders Co.

400 For Overhead Maintenance—Bulletin G205RR, 8 pp, tells how to control costs when maintenance goes above arm's reach—for painting and cleaning, electrical work, etc. Pictures a variety of scaffolding arrangements. Provides brief product information on steel and aluminum scaffolding, ladders and extension trestles. The Patent Scaffolding Co., Inc.

401 For Maintenance, Sanitation — This 44-pp catalog contains information on sanitation and maintenance products for industrial and other buildings. Products are placed in separate division for easy selection, with descriptive copy telling what product does, how it works, where it may be used to best advantage. Index lists floor maintenance products, soaps, germicides, insecticides, cleaning compounds. Huntington Laboratories, Inc.

402 Vacuum Units — This bulletin describes heavy-duty, portable vacuum units designed for a variety of plant housekeeping jobs. Application in re-

Note imbedded Nylon plug — locks screw automatically
SEXAUER
EASY-TITE
Note Fiberglas backing — resists closing squeeze

NEW WAY TO

Prevent Faucet Leaks!

★ **9 out of 10 washers are fastened with screws that are TOO LONG or SHORT. The screws quickly loosen; the loosened washers are destroyed thru grind and squeeze of opening and closing faucets.**

34 years of research uncovers new solution

★ **Now, NEW (Patented) 'Sexauer' SELF-LOCK Monel screws, with an imbedded expanding NYLON PLUG, lock at the required depth AUTOMATICALLY, hold washers FIRMLY! Made of rustproof, non-corroding Monel, heads don't twist off, screw slots don't distort. They are easily removed when necessary, can be re-used repeatedly.**

★ **Used with NEW 'Sexauer' EASY-TITE faucet washers, they make a combination that outlasts past faucet repairs "6-to-1"! EASY-TITES are made of super-tough, pliable du Pont compound (neither rubber nor fibre) and reinforced, like a tire, with a vulcanized layer of Fiberglas. They resist distortion and splitting from shut-off grind and squeeze.**

Hidden costs of faucet leaks!

Faucet leaks are costly! As authenticated by Hackensack, N. J. Water Co. and American Gas Association, stopping just ONE PIN-HOLE SIZE (1/32") LEAK can reduce water waste 8,000 gal. quarterly. If a HOT WATER FAUCET LEAK, water and fuel savings JUMP to over $7.58 QUARTERLY—plus additional savings on MATERIALS, LABOR and costly FIXTURE REPLACEMENTS!

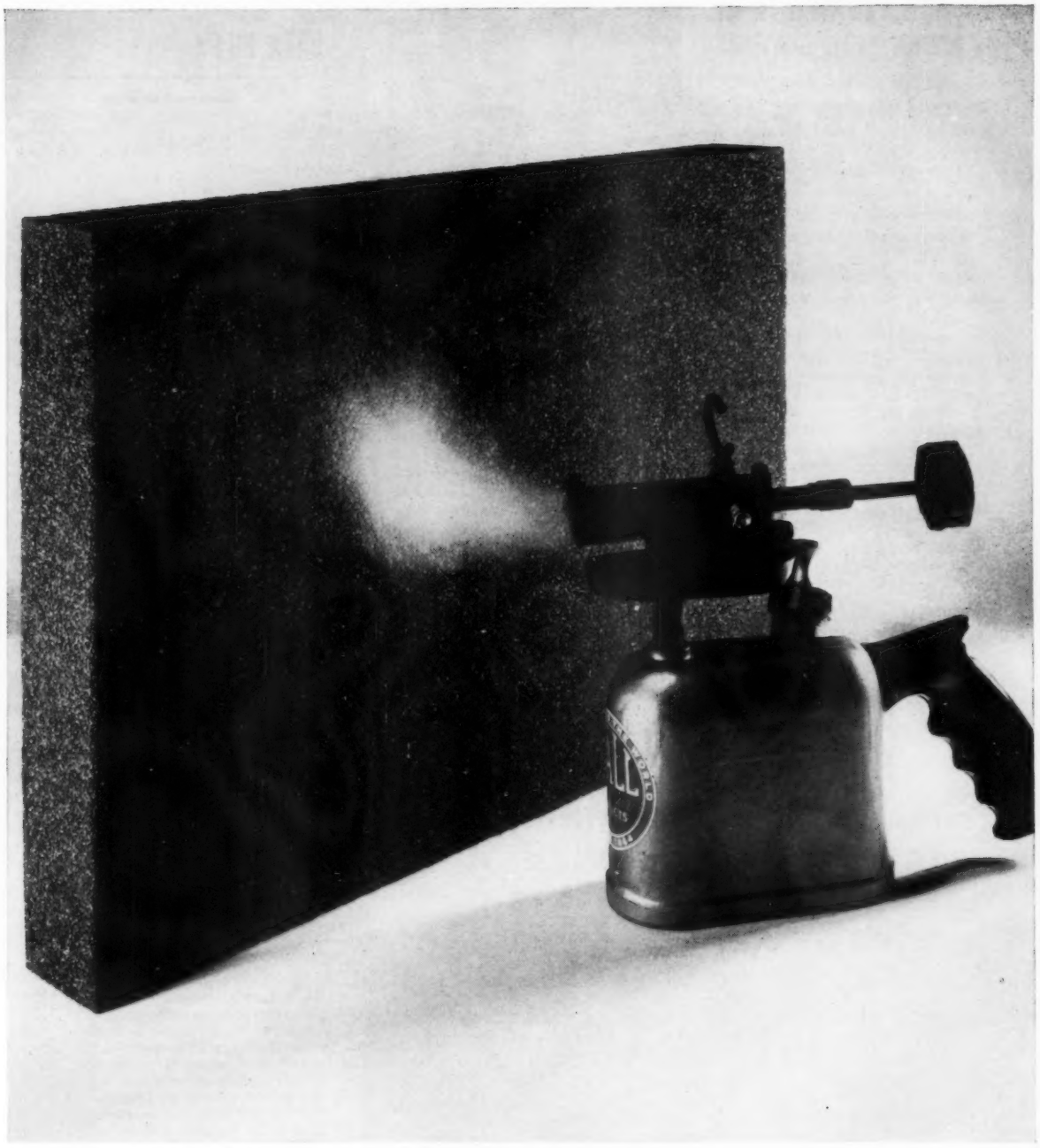
NEW SELF-LOCK screws and EASY-TITE faucet washers are just TWO of the "SEXAUER" line of over 3000 TRIPLE-WEAR plumbing repair parts and Pat'd. precision tools.

A "SEXAUER" Technician in your vicinity will make our NEW 126 page Catalog "H" available. He will gladly consult with you regarding a SURVEY of your plumbing fixtures to determine correct repair parts required and establish reasonable stock levels that avoid both overstocking and shortages—thus providing for efficient stock arrangement and control—all without obligation. WRITE TODAY!

J. A. Sexauer Mfg. Co., Inc., Dept. S-48
2503-05 Third Ave., New York 51, N. Y.
Gentlemen: *Please send me a copy of your NEW, 126 page catalog "H."*
My Name _____ Title _____
Company or Institution _____
City _____
Zone _____ State _____

SEXAUER
WORLD'S LEADING SPECIALISTS IN PLUMBING AND HEATING REPAIR PARTS

For more facts circle 660 on Reply Card



. . . always an insulation investment; never an insulating expense

FOAMGLAS® CAN'T BURN

Most insulations are combustible. They create a serious fire hazard in insulated buildings or on piping and equipment. You eliminate that hazard when you insulate with FOAMGLAS. Composed entirely of glass, FOAMGLAS can't burn. There's more to this insulation investment story. FOAMGLAS is waterproof and vapor-proof to insure lasting insulating value. It's dimensionally stable . . . unusually strong . . . acid-proof . . . vermin-proof . . . easy, economical to handle and install. Learn how to make this safe investment in your own insulated buildings, piping and equipment. Write for our latest catalog containing complete specification and application data. PC Glass Blocks are another outstanding building product of Pittsburgh Corning Corporation.

PITTSBURGH CORNING CORPORATION

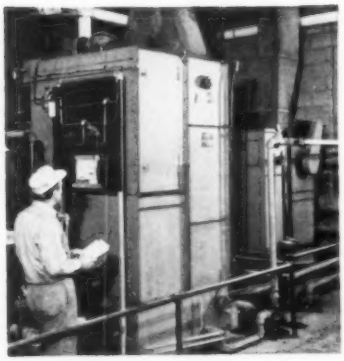
Dept. PE-48, One Gateway Center, Pittsburgh 22, Pa. • In Canada: 57 Bloor Street West, Toronto, Ontario

For more facts circle 661 on Reply Card

DRY and CLEAN AIR at the RIGHT TEMPERATURE

- to control your product quality
- to protect a critical operation
- to protect apparatus from moisture damage
- to DRY your material or product
- to control packing or storage conditions
- to assure precision in testing or research
- to increase air conditioning capacity

Air Condition by the NIAGARA Method Using HYGROL Liquid Absorbent



This compact method, giving high capacity in small space, removes moisture from air by contact with a liquid in a small spray chamber. The liquid spray contact temperature and the absorbent concentration, factors that are easily and positively controlled, determine exactly the amount of moisture remaining in the air.

Most effective because . . . it removes moisture as a separate function from cooling or heating and so gives a precise result, and always. Niagara machines using liquid contact means of drying air have given over 20 years of service. The apparatus is simple, parts are accessible, controls are trustworthy.

Most reliable because . . . the absorbent is continuously reconcentrated automatically. No moisture-sensitive instruments are required to control your conditions . . . no solids, salts or solutions of solids are used and there are no corrosive or reactive substances.

Most flexible because . . . you can obtain any condition at will and hold it as long as you wish in either continuous production, testing or storage.

Write for Bulletins 112 and 131 and complete information on your air conditioning problem.

NIAGARA BLOWER COMPANY

Dept. PE-4, 405 Lexington Ave., New York 17, N. Y.

Niagara District Engineers in Principal Cities of U. S. and Canada

For more facts circle 662 on Reply Card

DURAMETALLIC PACKINGS MEAN LONGER SERVICE, LESS FRICTION ON SHAFTS AND FEWER SHUT-DOWNS

WRITE TODAY for File No. DMPN, covering a variety of types and styles of Durametallic and Dura Plastic Packings.

DURAMETALLIC The PERFECT SEAL CORPORATION
KALAMAZOO MICHIGAN

For more facts circle 663 on Reply Card

DATA FILE

(Begins on page 222)

moving litter, conveying or reclaiming materials, and collecting hazardous matter is covered. Invincible Vacuum Cleaner Mfg. Co.

403 Industrial Vacuum Cleaning — Twelve-pp Bulletin 155 B describes both stationary vacuum cleaning equipment and portable industrial vacuum cleaners, the latter in both light and heavy-duty types. Recent improvements in collection and dumping methods are covered, and photos show application to conveying, reclaiming, bench work. Spencer Turbine Co.

MATERIALS HANDLING

406 For Overhead Handling—Booklet 2008-M, 12pp, is replete with illustrative material on principal components of overhead handling systems. Track design and advantages of supporting it flexibly are described, and formulas and figures for comparing various track sections are included. Among subjects covered are various carriers for hand, electric and automatic operation; tractors; track switches. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

407 Overhead Dispatch System — Form F 192, 8 pp, describes an automatic overhead dispatch system designed to solve a variety of materials handling problems. Outstanding advantages are listed and typical installations are described and illustrated with detailed diagrams. Component equipment utilized in this system is described. Richards-Wilcox Mfg. Co.

408 Electric Hoists—This illustrated brochure describes company's line of electric hoists designed for big-lift applications. A large cut-away view showing component features is included. R. G. LeTourneau, Inc.

409 Chain Hoists — Catalog 61, 20 pp, describes construction and design features of company's multiple gear chain hoists, with a large cutaway view showing component parts included. A table of dimensions is given, as well as dimensional diagrams, shipping information, parts list prices and other pertinent data. Reading Crane & Hoist Corp.

410 On Chain Block Safety—This wall chart illustrates safe handling of chain blocks. Sketches cover nine principles of handling, showing what should always be done and what should never be done. Reverse side of the chart gives data on company's line of chain blocks and trolleys. Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc.

411 Cranes, Monorail Systems—This 8-pp catalog describes cranes and monorail systems manufactured by the company. Contains complete specifications and information on capacities, dimensions and other details. Spanmaster Crane Div., Jervis B. Webb Co.

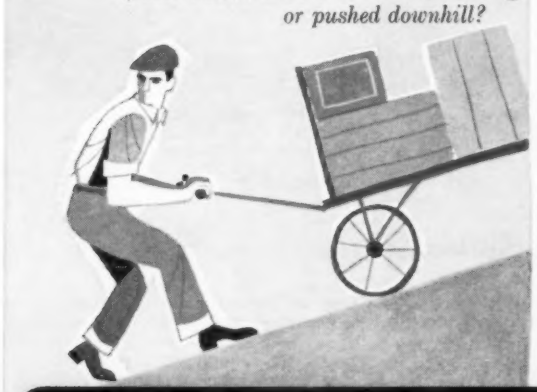
413 Rugged Little Hoist—Twelve-pp Bulletin 158-E describes the Lode-

do your employees know the answers?

which worker is lifting safely? 1

2 *which safety rule is this worker violating?*

should hand trucks or carts be pulled or pushed downhill? 3



4 *is this worker following good safety practice?*

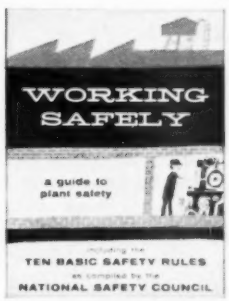
Give your workers a safety refresher course with "Working Safely"... a new safety booklet available from your STEEL SERVICE CENTER stocking Inland 4-WAY® Safety Plate

Safety is a subject we can never learn too much about. That's why you will be doing yourself and the employees in your plant a favor by providing them with copies of this new pocket-size guide to plant safety. "Working Safely" has been compiled by the Safety Engineers of Inland Steel Company and includes the ten basic safety rules of the National Safety Council as well as safety tips on many other subjects.

Copies of this booklet are available from your STEEL SERVICE CENTER.

Another Good Safety Rule—To cover those areas in your plant and on your products where feet and wheels must have safe, sure traction, use Inland 4-WAY Safety Plate ... 4-WAY is available in large, medium or small pattern, in a wide range of sizes and gages, from your local STEEL SERVICE CENTER ... the most logical source of supply for less-than-carload orders of steel and specialized steel services.

INLAND 4-WAY® SAFETY PLATE



answers:

1. Worker on right is lifting safely. Always bend knees when picking up heavy loads.

2. No safety shoes! He's risking a broken foot or toe!

3. Pushed... always. When you pull a cart, it can get away and run you down.

4. No! Never paint a ladder. It covers up cracks and weaknesses. Use clear varnish instead.

INLAND

Inland Steel Company
30 West Monroe St.,
Chicago 3, Illinois

For more facts circle 664 on Reply Card

VIKING PUMPS IT!

You can avoid messes, when moving sticky, viscous liquids . . . you can save time . . . and cut costs — all by using Viking Pumps.

Vikings are pumping thick liquids with outstanding results for thousands of users . . . and will for you, too. The positive action of the famous "gear-within-a-gear" is Vikings' secret of success.

You'll find Viking Pumps for most industrial needs. Sizes from ⅔ to 1050 gallons per minute. Over 750 catalogued models. Hundreds of special designs for individual problems.

Send us your problem — ask for folder **58SZ**

VIKING — the leader, not a follower, in Rotary Pumps

VIKING PUMP COMPANY

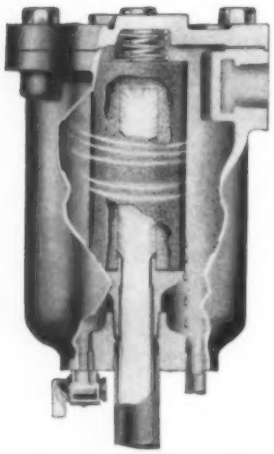
Cedar Falls, Iowa, U.S.A. In Canada, it's "ROTO-KING" pumps

See Our Catalog in Sweet's Plant Engineers File

For more facts circle 665 on Reply Card

ADAMS PORO-STONE AIR FILTER

designed to remove oil, water and foreign matter from compressed air lines with minimum pressure drop.



The R. P. Adams Poro-Stone air filter is engineered to efficiently remove entrained oil, water and pipe scale from compressed air lines. Liquid droplets and solids being carried by the gas stream are first removed by centrifugal action in an annular chamber. Secondary filtration is achieved by passing the air or gas stream through a Poro-stone unit. An automatic trap can be provided to discharge the residue from the cyclone chamber.

At rated capacity the filters operate at a maximum pressure drop of only ½ lb., thus insuring delivery of line pressure to the point of consumption.

The units require virtually no service or maintenance — thereby insuring continued trouble-free, low cost performance.

ADAMS Poro-Stone air filters are available from stock in sizes to suit your needs. For further information, write today for Bulletin 117, R. P. Adams Co., Inc., 254 East Park Drive, Buffalo 17, New York.

For more facts circle 666 on Reply Card

DATA FILE

(Begins on page 222)

star, a light weight but heavy duty, small electric hoist with push button control. Discusses low maintenance, safety, other advantages offered, and covers design features. Specifications and dimensions are given for both single- and double-chain models and accessories are illustrated. Chisholm-Moore Hoist Div., Columbus McKinnon Chain Corp.

415 Steel Conveyor Belts—"A profitable approach to the selection of steel processing conveyor belts" is the subject of this 16-pp bulletin. Simplified selection, standard specifications, and installation information are included. Photos and diagrams illustrate the text. The Colorado Fuel and Iron Corp.

417 For Bulk Materials—Latest information on equipment for storing and handling bulk materials is contained in 12-pp Bulletins 574. Descriptions, specifications and dimensions of vertical and horizontal tanks are included. Cost savings afforded by bulk storage and handling facilities noted. The Day Co.

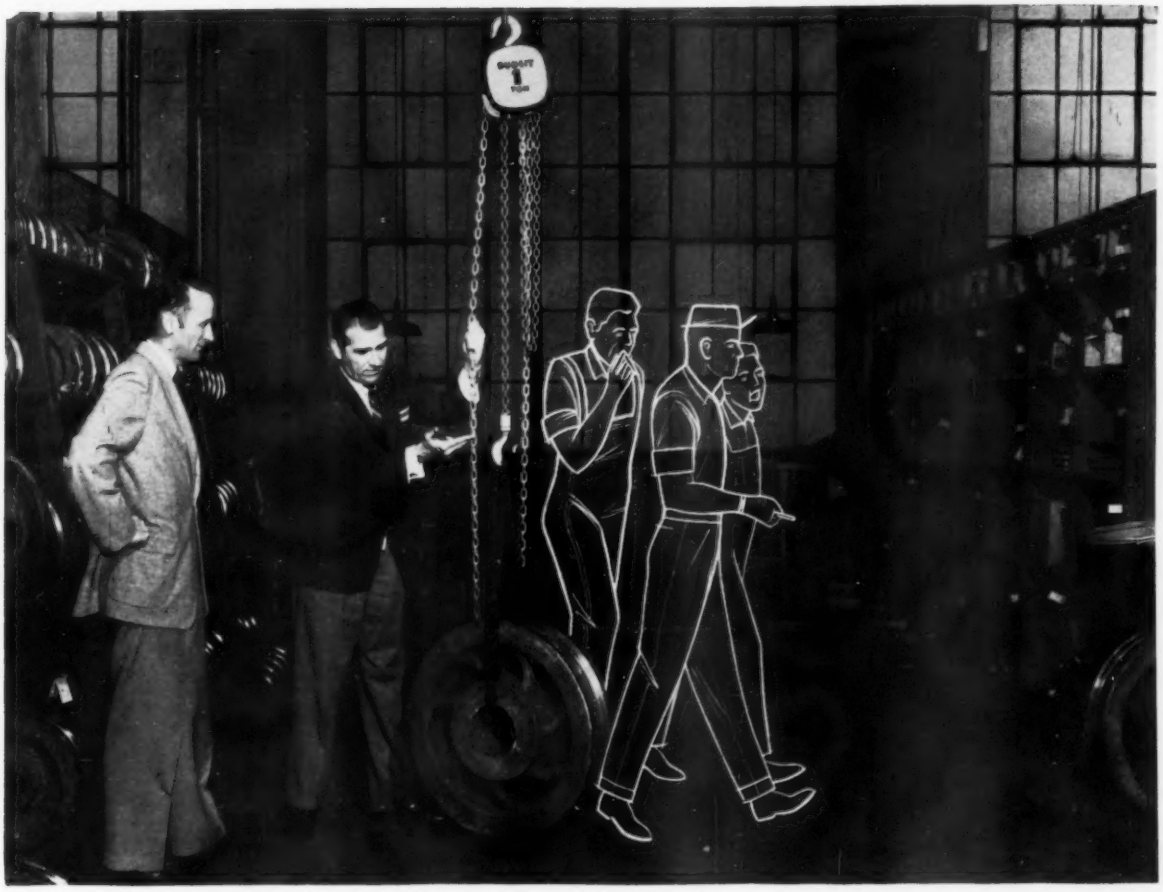
418 Sheet and Coil Lifters—Bulletin SL-30, 16 pp, illustrates and describes various types of standard and semi-special lifters for one-man or automatic handling of sheet and coil stock. Advantages and design features are detailed and tables listing dimensions included. Cullen-Friestedt Co.

419 Vertical Transportation—Selection of vertical transportation for every traffic-moving job is detailed in 32-pp Bulletin A-382. Various types of elevators and escalators for a variety of commercial and industrial applications are described and dimensional diagrams illustrating arrangements included. Recommended sizes and capacities are listed. Otis Elevator Co.

420 Cost-Cutting Materials Handling—"The How Book of Cost-Cutting Materials Handling," is a 24-pp booklet covering various phases of the materials handling problem and their effect on industrial production. Text and pictures cover such subjects as fundamental handling motions, advantages of planned material handling practices, analysis of handling organization, collecting handling data, diagramming travel. The Yale & Towne Mfg. Co.

421 Casters and Wheels—Catalog 125, 56 pp, includes helpful hints on selecting casters and wheels for many applications. Gives specifications on a line of casters, including forged steel, plate steel, cast steel, pressed steel and semi-steel in hundreds of styles and sizes, both swivel and rigid. Indexed for handy reference, also covers wheels, including steel, semi-steel, ductile iron, molded-on rubber-tired, renewable rubber tires, pneumatics, others. The Hamilton Caster & Mfg. Co.

422 Drop Forged Caster—Bulletin 7557 contains specification data on a line of drop forged steel heavy duty casters. Features of design and construction are illustrated and described. Faultless Caster Corp.



Free Demonstration Anywhere in Your Plant

See proof that the 'Budgit' Chain Block can cut your load handling costs

Be convinced — take us up on this free demonstration offer now.

Choose any plant area where lifting is a problem and a hoist can be hung. Then call your local 'Budgit' Distributor. See the yellow pages of your phone book — or write us for the name of the one nearby. He will bring and hang up a 'Budgit'. He will prove hoisting is an easy one-man job that frees manpower for other work.

'BUDGIT' SAVES TIME, ENERGY, MONEY

You will learn how only 25 lbs. of muscle effort can lift a 500 lb. load. You will see how fast the big, automatic load brake operates in spotting loads exactly where you want them. You will learn how light weight and strength are combined to produce a safe hoist that cuts lifting costs in emergencies, maintenance, construction, production.

All this and more are yours to see right in your own plant — without obligation.

'Budgit' Aluminum Chain Blocks are made in ¼ to 10-ton capacities, in top hook and Army-Type trolley styles. Spark and corrosion resistant models, too. Prices start at $125.

Call your Shaw-Box distributor today or ask us for Bulletins 15010-10, 15010-16, 15010-17, 15010-18.

Authorized service stations from coast to coast save time, trouble and money for every 'Budgit' user.

58C-2

MAXWELL MANNING & MOORE INC. TRADE MARK

'Budgit'® CHAIN BLOCKS

MANNING, MAXWELL & MOORE, INC.

SHAW-BOX CRANE & HOIST DIVISION

362 W. Broadway • Muskegon, Michigan

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Other Divisions produce 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, and 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments.

In Canada: *Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario*

For more facts circle 667 on Reply Card

Hobbs HOUR METERS for

MEASUREMENT OF USE

PROTECTIVE MAINTENANCE

Operating Time of Production and Service Equipment — AT A GLANCE!

To obtain maximum use of production and service equipment, it is essential to know the hours of operation. This information permits accurate study of utilization; also provides data needed for protective maintenance which improves performance and lengthens service through regular attention at the right time.

Hobbs Hour Meters indicate to the HOUR and MINUTE the time of equipment operation. Not a revolution counter, but a true timing instrument. ALTERNATING CURRENT meters time the operation of any equipment powered by a-c electricity; DIRECT CURRENT meters, the operation of any equipment powered by internal combustion engine or battery.

● **Distributors in Principal Cities**
WRITE FOR CATALOG 600

JOHN W. Hobbs CORPORATION — A DIVISION OF STEWART SW WARNER
2054 YALE BLVD. SPRINGFIELD, ILLINOIS

For more facts circle 668 on Reply Card

DATA FILE

(Begins on page 222)

SAFETY, SANITATION

425 Protective Clothing — Catalog 12000, 12 pp, describes and illustrates company's line of industrial clothing for protection against water, fire, acids and alkalis, slipping and scuffing. Various types of work gloves and suits and coats are featured, and protective advantages of this equipment are pointed out. The B. F. Goodrich Co.

426 Waterless Washstation—This large fold-out brochure illustrates and describes advantages of company's waterless washroom unit for hand washing on the job. Describes the waterless skin cleanser used, as well as the dispenser and waste receptacle. Sugar Beet Products Co.

ELECTRICAL

428 Totally-Enclosed Motors—Bulletin 500-A describes company's totally-enclosed, fan-cooled motors in ratings from ½ to 40 hp. Ratings and dimensions listed. Robbins & Myers, Inc.

429 Variable Speed Motors—Sixteen-pp Bulletin 1797, revised, outlines many reasons why variable speed motors can be used to improve production, and it includes illustrations of all types of company's Varidrive motors, as well as

SAFETY FIRST and savings, too!

with INSUL-8-BAR® SYSTEMS

Mobile Safety Electrification for Cranes, Monorails, All Moving Machinery.

These are the only enclosed conductor systems that meet *all* requirements of mobile safety electrification. Standard catalog parts eliminate the need for special engineering. Installation is fast, maintenance easy. Investigate today!

CLIP COUPON FOR CATALOG — INSUL8 CORP

INSUL-8-CORP.
Dept. E, 1369 Industrial Rd., San Carlos, Calif.

Rush catalog re Insul-8-Bar mobile electrification.

NAME_____

COMPANY_____

ADDRESS_____

For more facts circle 669 on Reply Card

RAIL AND TRACK EQUIPMENT

You can get everything you need for industrial track and crane runways —with one call to your nearest Foster office. Immediate deliveries from the nation's largest warehouser of rails (both new and relaying), switch material, and track accessories. Send for free catalogs and ordering guides.

Complete Contractor Service—Since 1901

Send for Catalog PE-4

L. B. FOSTER Co.

PITTSBURGH 30 • ATLANTA 8 • NEW YORK 7
CHICAGO 4 • HOUSTON 2 • LOS ANGELES 5

For more facts circle 670 on Reply Card

CLASSIFIED ADVERTISING

EQUIPMENT FOR SALE

Stainless Precision Tools

Stainless Steel T-Squares, Triangles, Straightedges, and Precision Drawing Instruments and Scales.

CATALOG ON REQUEST

THEO. ALTENEDER & SONS

Since 1850
1219 Spring Garden St., Philadelphia 23, Pa.

FOR SALE

1—Westinghouse DE-ION Grid Oil Circuit Breaker, Type GO-I-A, 34500 volts rating, serial S.O. 1-3Y1526, 600 amps,—mfg. date 1946—60 cycle, instrument book 33-746 and 5567—impulse withstand 200 KV, 32 gal. of oil per tank, total weight without oil 3450 lbs.—weight of oil and tank 385 lbs.

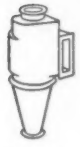
3—General Electric single phase transformers—Type HS, 60 cycle, 33000V PRI 485V—sec. with 5-2½% taps, 5.2% impedence at 75°C, 400 KVA, 55°C rise, subtractive polarity, serial Nos. 7527469, 7527470, 7527471.

Address Box 2061, c/o Plant Engineering 308 East James St., Barrington, Ill.

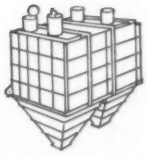
FOR SALE AT REASONABLE PRICE

Six Detroit Roto Spreaders, Fronts and Dumping Grates. Now installed on three B&W Type F. F.—16-28 Boilers. Excellent condition. Now in operation. Will be removed this summer and replaced with continuous cleaning type stokers. Address Box 2060, c/o Plant Engineering 308 East James St., Barrington, Ill.

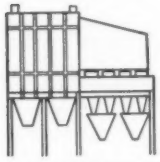
Pay dirt!
...year after year!



BUELL CYCLONE



"SF" ELECTRIC PRECIPITATOR



PRECIPITATOR-CYCLONE COMBINATION

Buell Cyclone collectors pay off two ways: extra efficiency from the start . . . and extra years of operation, with little if any maintenance. Unique features like Buell's exclusive Shave-off deliver an extra percentage of dust collection efficiency: in nearly all cases, Buell installations pay for themselves in just a few years. And heavy plate construction, scientific proportioning, side entry of dust-laden gases are reasons why they keep on earning for many, many years. For specific details, write for "The Collection and Recovery of Industrial Dusts". Just write Dept. 14-D, Buell Engineering Company, Inc., 123 Williams Street, N. Y. 38, N. Y.

buell®

Experts at delivering Extra Efficiency in **DUST COLLECTION SYSTEMS**

For more facts circle 671 on Reply Card

DATA FILE

(Begins on page 222)

their mechanical features, remote controls, etc. U. S. Electrical Motors, Inc.

430 Vertical Motors—Bulletin 2050 presents "climatized" vertical hollow shaft motors for shallow and deep-well turbine application. Advantages of the weather-protected enclosure are stressed and other construction features noted. Also explained are installation and maintenance time-reducing features. The Louis Allis Co.

433 Switches, Controls—Publication EA-100, 76 pp, offers quick selection data on manufacturer's line of safety switches, service control, motor control and accessories. Fully illustrated, booklet provides ordering information, brief text on applications, features, heater coil selection data, and general information. Cutler-Hammer, Inc.

435 Secondary Unit Substations—Bulletin 9004-A, 20 pp, describes lower cost, complete flexibility and space saving of secondary unit substations. Photos and charts of construction are provided, also standard KVA ratings covering all types of indoor and outdoor substations. I-T-E Circuit Breaker Co.

436 Electrical Equipment Digest—Electrical equipment illustrated and described in 154-pp Catalog Digest 140, includes load centers, circuit breakers, low voltage control, fusible service equipment, interchangeable hubs, meter equipment and accessories, meter sockets and troughs, safety switches, panelboards, duct and fittings, starters, magnetic breaks, relays, contactors, other equipment. Square D Co.

437 Trolley Busway Systems—Three bulletins offer real help on electrical installations involving cranes and hoists, assembly and production lines, moving test lines and other moving electrical equipment. Bulletin 35 (28 pp) covers 225-500 amp systems; Bulletin 50 (44 pp) 100 amp systems; Bulletin 45 (40 pp) 60 amp systems. Each includes special sections on installation planning and procedure, methods of mounting. Feedrail Corp.

439 Conductor Systems—This 36-pp catalog describes the Insul-8-Bar systems of mobile safety electrification for cranes, monorails and moving machinery. Includes photos and descriptions of typical installations, engineering data, installation procedure, a photo-text list of all catalog items that comprise these enclosed conductor systems. Catalog also explains how low cost safety is made possible by their simplicity. Insul-8-Corp.

440 Wires and Cables—Interlocked armored cable, supports and fittings designed for low cost, heavy duty industrial, power or control wiring are described in this 24-pp bulletin. Photos and specific descriptions of various types of armored cables available for voltages through 15,000 v, single and multi-conductor are included. Arranged in table form are dimensional data. National Electric Products Corp.

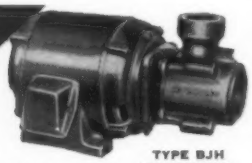
441 Cathodic Protection Cable—Two kinds of cathodic protection cables are described in this informative bulletin. Special advantages of each are listed, and applications and specifications are given. General Cable Corp.

443 For High Voltage Cable—Test results and service records on an improved butyl rubber compound for high-voltage cables are announced in 12-pp Bulletin EB-27. Covers resistance to ozone, operating temperature, high-voltage, dielectric strength, aging, insulating resistance, mechanical moisture absorption, electrical moisture absorption, capacity and power factor. Anaconda Wire & Cable Co.

445 Fuses for All Uses—This revised edition of manufacturer's complete line, Folder 3, includes illustrations and descriptions of fuses for every purpose. Features dual-element cartridge fuses for time-lag in protection against overloads, and delay renewable fuses and renewal links. Economy Fuse & Mfg. Co.

446 Asbestos Insulation—"Specifications for Asbestos Varnished Cambric N.E.C. Type AVA Lighting Wire and Power Cables," 8 pp, establishes performance tests for asbestos insulation applied as a felted wall in combination with varnished cambric tapes for wires and cables with 600 and 1000 v ratings. Rockbestos Products Corp.

A GREAT NEW SERIES "by Aurora"



TYPE BJH HORIZONTAL

AURORA®
General Purpose
CLOSE-COUPLED
CENTRIFUGAL PUMPS

IDEAL for
AIR CONDITIONING
REFRIGERATION
COOLANT
HOT WATER
CHEMICAL*
GENERAL PURPOSE
*In special alloys to meet specific conditions

These are compact, simple, lasting pumps with low NPSH characteristics to meet critical suction conditions — for wide range of duties including hot water and chemicals handling.

TYPE BJF FLANGE MOUNTED

MANY VALUE FEATURES
SEALS or GLANDS — Available in either as desired.
SPEEDS — 3,500, 1750 (60 cycle) and 2,880, 1,440 (50 cycle) speeds.
CURRENT — AC or DC — All voltages and phases.
MOTORS — 1/6 to 7-1/2 H.P. drip-proof, splash-proof, totally enclosed, explosion-proof and chemical. Quiet, efficient NEMA standard.
COMPACT, QUIET, ECONOMICAL

CONSULT WITH US

TYPE BJV BASE MOUNTED

WRITE FOR BULLETIN 119

DISTRIBUTORS IN PRINCIPAL CITIES

AURORA PUMP DIVISION
THE NEW YORK AIR BRAKE COMPANY
44 LOUCKS STREET • AURORA • ILLINOIS
EXPORT DEPARTMENT — Aurora, Illinois — Cable Address "NYABINT"

For more facts circle 672 on Reply Card

BONDSTRAND®
fiber-glass reinforced
epoxy pipe by Amercoat®

...strong as steel pipe, only ⅛ the weight. Tensile: hoop 80,000 psi, longitudinal 40,000. Highly corrosion resistant. Won't scale, cold flow or deform. 20-ft. lengths easy to cut and join. Fittings available.

DIAMETERS 2 TO 12 INCHES...
TO 40 INCHES ON SPECIAL ORDER

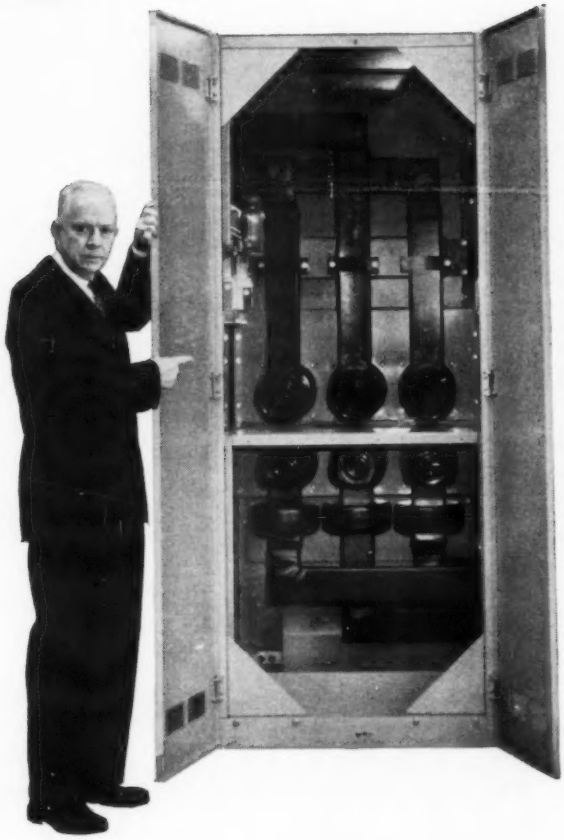
WRITE FOR BONDSTRAND TECHNICAL DATA SHEET

Amercoat® CORPORATION

4809 Firestone Blvd., South Gate, Calif. Dept. LB 1108

For more facts circle 673 on Reply Card

METAL-CLAD SWITCHGEAR



HOW MUCH DO YOU NEED A HINGED REAR DOOR?

Some switchgear makers say you don't need it at all. They say you should struggle with a 75-lb. sheet metal cover and grope for the screw holes. That's good enough for you, they say.

But I-T-E gives you hinged rear doors as standard equipment on metal-clad switchgear—at no extra cost. And many other features besides. More solid construction throughout . . . means longer life. Sturdier enclosures to simplify installation. Finer finishes to give your whole switchboard a richer look. Examine an I-T-E switchgear installation. It is just plain better built. But you pay no more.

How much do you need I-T-E's double blowout coils —standard on 15 kv circuit breakers? Under all fault currents, here is extra protection, plus assurance of longer circuit breaker life that no other switchgear offers you. Yet I-T-E charges you no more.

Recently I-T-E developed FLAMETRAP insulation that snuffs out flame in seconds and leaves no toxic fumes. It is today's most advanced flame retardant insulation—now yours on I-T-E switchgear for no extra cost.

This briefly is I-T-E's policy: to make its switchgear better, in construction, performance and appearance—but to charge no more. Why not make sure that you get all the value your switchgear dollars can buy. Get I-T-E switchgear. For a complete outline of our extra-quality features, write Switchgear Division, I-T-E Circuit Breaker Company, 19th & Hamilton Sts., Philadelphia 30, Pa. In Canada: Eastern Power Devices Ltd., Port Credit, Ont.

I-T-E CIRCUIT BREAKER COMPANY
PHILADELPHIA, PENNSYLVANIA

For more facts circle 674 on Reply Card

DATA FILE

(Begins on page 222)

447 Flexible Cords—This well illustrated 24-pp booklet includes all new Underwriters classifications for flexible cords manufactured by this company. Featuring data on Dynaprene and rubber jacketed cords as well as braid covered types, also gives tips on selection. Whitney Blake Co.

LIGHTING

448 Architectural Floodlighting—Eight-pp Bulletin GEA-6437 illustrates various methods of floodlighting industrial plants, public and commercial buildings and others. Provides information on general purpose heavy-duty floodlights. Also contains tips on floodlighting of vertical surfaces. General Electric Co.

449 Outdoor Mercury Lighting—"How Mercury Vapor Outdoor Lighting Brings More Night Action." 8 pp, stresses low cost and versatility of mercury vapor lamps. Shows their uses in industrial areas, parking lots. Sylvania Electric Products, Inc.

450 Emergency Lighting—Publication 243A, 20 pp, describes various aspects of emergency lighting and features a system designed to provide automatic and instantaneous emergency lighting in event of a power interruption. Components of system are individually treated, and capacities, ratings, specifications are included, along with wiring diagrams, descriptions of fixtures. The Standard Electric Time Co.

451 Lamps for Industry—Eight-pp Bulletin 66 presents manufacturer's line of lamps for industrial service, indoors and outdoors. These include mercury vapor lamps, weatherproof floodlights, high bay reflector lamps, spotlights, infra-red lamps, spatterproof lamps, and others. Illustrated with photos, curves indicating candlepower. Radiant Lamp Corp.

454 Lighting Equipment—Bulletin 2697, 52 pp, contains detailed information on a line of lighting equipment, including floodlights, searchlights, industrial lighting and fixture condulets. Two new items—mercury vapor floodlights and vapor master lighting fixtures—are also covered. Description of each item is given along with list price. Crouse-Hinds Co.

MECHANICAL POWER TRANSMISSION

455 More Power per Pound—Book 2447, 28 pp, describes company's line of Gearmotors and Motogears, both designed in keeping with NEMA motor sizes which deliver more horsepower per pound. Provides complete selection data together with construction features, load classifications, dimension tables, overhung load ratings and mounting assemblies. Link-Belt Co.

456 Magnetic Drives—Data on design, drive features, opening and performance curves, output torque ratingdimensions, selection chart, as well as photos of installations and applications are included in 6-pp Bulletin W-T 1-57. Whitney Chain Co.

457 Power Transmission Machinery—Bulletin A-646A, 8 pp, contains data on company's power transmission machinery, including sheaves, sprockets, bushings. conveyor pulleys, couplings, speed reducers, clutches, bearings, takeups, V-belts, collars, and steel transmission pulleys. Also described is a dry fluid drive. Dodge Mfg. Corp.

Postage-free cards for ordering catalogs are on page 218. You may also use the cards to order literature mentioned in the ads.

458 Transmission Products — Catalog 914, 88 pp, features company's transmission products and their uses in elevating and conveying machinery. Descriptive information with drawings and tables of dimensions covers shaft collars, couplings, clutches, pillow blocks, tape-ups, wheel hubs, gears, holdbacks, chains and sprocket wheels. The Jeffrey Mfg. Co.

459 Plastic-Cored Belt—Detailed information on company's plastic-cored belting is presented in two bulletins. One presents design and application

50% STRONGER

THAN COMMON SHACKLES

CROSBY-LAUGHLIN

Load-Rated* SHACKLES

⅓ TO 75-TON CAPACITIES

Guaranteed capacities are offered by new Crosby-Laughlin* "Load Rated" Shackles that have their safe working load drop forged in the body. Special steels, drop forged—heat treated, plus perfect pin alignment produce quality shackles actually 50% stronger than common shackles, *size for size!* Select from a broad line of round pin, screw and safety shackles in anchor and chain styles . . . be sure you get RED fittings—symbol of *genuine* Crosby-Laughlin "Load Rated" Fittings—it's the world's most complete line. *New catalog* now available from mill supply, construction or industrial equipment distributors. Or write:

*Trademark

CROSBY-LAUGHLIN Division

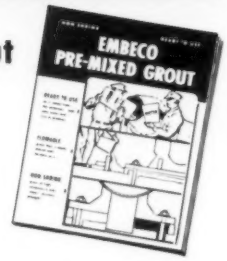
AMERICAN HOIST & DERRICK COMPANY

FT. WAYNE 1, INDIANA

For more facts circle 675 on Reply Card

GET THIS FREE GROUTING GUIDE

... before you Grout another piece of heavy equipment



Send for this *free* grouting guide which clearly illustrates 11 common machinery settings, methods of grouting and forming, and hot and cold weather grouting. Discussion covers proper mixing and placing of grout, reasons for using prepared, nonshrink grout, etc.

Products sold in Canada are Manufactured in Canada

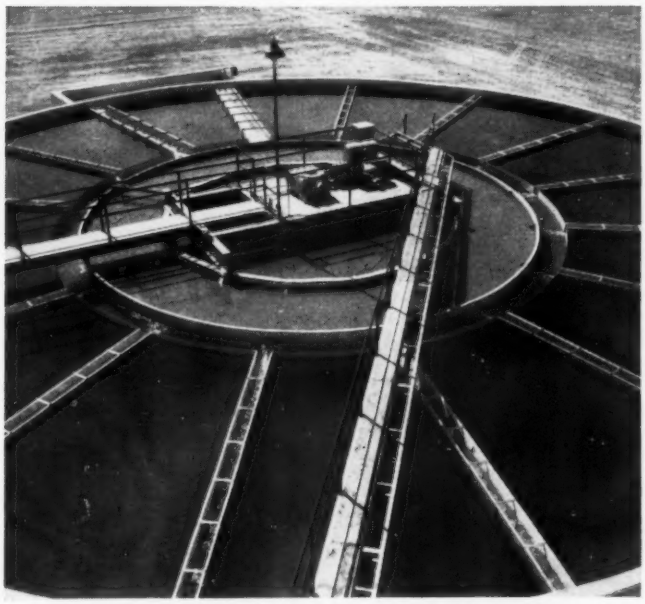
The MASTER BUILDERS Co. Ltd.

Subsidiary of American-Marietta Company

95 INGRAM DRIVE TORONTO 9, ONTARIO

For more facts circle 676 on Reply Card

CLEARER WATER · FASTER OPERATION · IMPROVED CAPACITY



Water clarification plant treating 10,500 gallons per minute.
Photo courtesy of Infilco, Inc., Tucson, Arizona.

when coagulation is improved with HAGAN *Coagulant* AIDS

Used in small quantities, Hagan Coagulant Aids produce larger, heavier, tougher flocs over wider pH ranges than coagulants alone. Safe for use in potable waters, Hagan Coagulant Aids are completely harmless, and non-irritating to handle.

Available in formulations suitable for a variety of water conditions, Hagan Coagulant Aids can help in many ways. They are compounded in free-flowing granular form for ease in dry feeding, but may also be fed as a solution. With the larger, heavier floc they produce, settling time is shortened, carry-over is practically eliminated, the sludge blankets stabilized . . . chemical treatment is simplified and chemical costs often reduced.

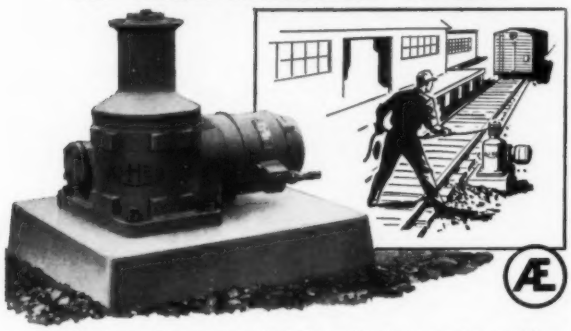
Hagan engineers will be happy to assist you in determining the best Coagulant Aid for your particular operation. Write or phone for complete information.

HAGAN CHEMICALS & CONTROLS, INC.

HAGAN BUILDING, PITTSBURGH 30, PENNSYLVANIA
DIVISIONS: CALGON COMPANY, HALL LABORATORIES
IN CANADA: HAGAN CORPORATION (CANADA) LIMITED, TORONTO

For more facts circle 677 on Reply Card

NOW! STOP WASTEFUL EXPENSE AT YOUR RAILROAD SIDING



IF YOU actually saw a Lo-Hed Car puller in operation you'd probably order one in a hurry. It is a first rate investment — pays for itself fast. It puts a stop to shifting charges. Cars get loaded and unloaded in record time. Demurrage charges are slashed. Industrial accidents are minimized . . . And a Lo-Hed Car Puller saves money *inside* a plant, too — pulls loads in a straight line, up grades and around corners.

Lo-Hed Car Puller is rugged, electrically-driven, built for trouble-free service. Write for folder telling you how to use a Car Puller in your plant.

AMERICAN ENGINEERING COMPANY
Dept. CP-181, Wheatsheaf Lane & Sepviva St., Philadelphia 37, Pa.
CANADIAN SUBSIDIARIES: Affiliated Engineering Corporations, Ltd. Montreal, P. Q. . . . Bawden Industries Ltd., Toronto, Ont.

For more facts circle 678 on Reply Card

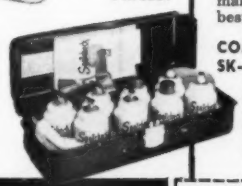
Find Cracks Fast!

NEW Fire-Safe Testing get Spotcheck®

NO INCREASE IN KIT PRICES!

SPRAY-ON DYE PENETRANT INSPECTION BY MAGNAFLUX

Now all Spotcheck spray can materials are in nonflammable or high-flash-point nontoxic formulas. Use new fire-safe Spotcheck anywhere in the plant to detect cracks, leaks, porosity — any defect open to the surface. Save money — end guesswork on in-process or maintenance inspection. Thousands say it's best, safest, cheapest dye penetrant testing.



COMPLETE SK-3 KIT **$36.00** U.S.A. only F.O.B. our plant Chicago, Illinois

Everything you need in handy, lightweight rugged carrying case. 2 spray cans Penetrant, 2 spray cans Developer, 4 spray cans Cleaner, instruction book, cleaning cloth, wire brush.

ACCEPT NO SUBSTITUTES!
CALL YOUR INDUSTRIAL DISTRIBUTOR or Mail Check or P.O. with Coupon TODAY!

MAGNAFLUX CORPORATION
7339 W. Ainslie Ave., Chicago 31, Illinois
☐ Please send me ____ SK-3 kits at $36.00 each, FOB our plant Chicago.
☐ Send FREE bulletin only. Includes low Spotcheck material prices.
Name ____ Title ____
Company ____
Address ____
City ____ Zone ____ State ____

For more facts circle 679 on Reply Card

DOUBLE TROUBLE STOPPED by CHEMPRO TEFLON*

In high speed pumps handling highly corrosive chemicals, Chempro Teflon has drastically cut pump down-time caused by scored shafts and short packing life.

"Scored" Shafts

eliminated by using CHEMPRO TEFLON SEAL CAGES†. Last many times longer than metal lantern rings under continuous corrosive attack. Snap on and off shaft quickly and easily. No vibration at high speeds. Can stand high gland pressures.

†Patented

Short Packing Life

solved by using CHEMPRO TEFLON RING PACKINGS. Give months of leak-free service compared with days and even hours for conventional packings. Require only slight gland pressure. Low coefficient of friction often makes lubrication unnecessary.

Complete information given in Bulletin CP552

*duPont Trademark

CHEMICAL & POWER PRODUCTS, Inc.

7 Broadway, New York 4, N. Y.

For more facts circle 681 on Reply Card

DATA FILE

(Begins on page 222)

data, as well as selection tables, on Tanastic—a plastic-cored flat belt with chrome leather. The other bulletin covers Texalon—a combination of woven textile and flat ribbons of extruded nylon welded together into a flexible unit. J. E. Rhoads & Sons.

460 Chains and Sprockets—Catalog 37 contains 30 pp of information on company's conveying and double-pitch power transmission chains and sprockets. Standard chain and attachments are illustrated and charts are used to provide pertinent engineering data for selection. Diamond Chain Co., Inc.

461 What's In a V-Belt?—Informative little 16-pp Booklet S-51105 describes raw materials used in producing V-belts. Natural and synthetic rubbers, cotton and synthetic cords, rubber chemicals and steel cables used in company's line are subjects for explanations of each material's role in the final product. Goodyear Tire & Rubber Co.

463 Flexible Couplings—Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings for power transmission. Tells advantages of these couplings and discusses design principles. Double-flexing and floating shaft types, light duty couplings and types for special applications are detailed. Thomas Flexible Coupling Co.

464 Cylindrical Roller Bearings—Multi-Row cylindrical roll neck bearings are described in 24-pp Form 436. Contains complete engineering and technical data on cylindrical roller bearings designed for heavy-duty service in roll neck mountings on hot and cold rolling mills. SKF Industries, Inc.

INSTRUMENTS, CONTROLS

465 Temperature Controls—Eight-pp Catalog CC, on temperature controls and allied equipment for heating and refrigeration, provides information on recording, indicating non-indicating controls; thermometers; bulb installation accessories. The Partlow Corp.

466 Resistance Temperature Detectors—In 8-pp Publication 3016D are described a line of remote temperature-sensitive elements for use in indicating, recording, controlling and monitoring equipment. Operations, application and construction details of the resistance temperature detectors are presented, along with specifications. Instrument Div., Thomas A. Edison, Inc.

467 Stroboscope Data—Applications of the electronic stroboscope are illustrated and described in 8-pp Form 766-C. Includes complete descriptive and specification data on the Strobotac—a small, portable stroboscope tachometer—as well as on the Strobolux, the Strobolume and the Microflash, used to produce single flashes enabling photos to be made of extremely fast action. General Radio Co.

468 Gages, Needle Valves—Catalog 76-G consists of a loose-leaf bound collection of literature on gages and needle valves. Various types of gages are illustrated and described, with applications and specifications fully detailed. A section on accessories is included, as well as one on specification, covering gage dimensions, dimensional diagrams, dial graduations, and other data. Jas. P. Marsh Corp.

469 For Limited Panel Space—Bulletin 532 describes Model 216 indicator used with company's automatic tank contents gage. Bulletin contains a full illustration of indicator which, although occupying a small space, has a scale 20 in. long. The Liquidometer Co.

OTHER EQUIPMENT

470 Industrial Finishing Equipment—Catalog A-657, 12 pp, describes a complete modern finishing system for cleaning, rust proofing, drying, painting and finish baking operations. The R. C. Mahon Co.

471 Storage Equipment—Catalog 100-F, 72 pp illustrates and describes company's complete line of steel cabinets, folding chairs, work benches, tool stands, shelving, tool storage, lockers, coat racks, filing cabinets, revolving bins, others. Includes dimensions and specifications, as well as installation photos. Lyon Metal Products, Inc.

473 Equipment Selector Charts—Bulletin CE-50, 20 pp, contains selector charts on corrosion-resistant equipment for process industries. Tables cover general considerations in selection of material, physical properties, corrosion resistance, techniques and skill in manufacture of equipment. Describes rubber and plastic pipe, tubing and fittings; valves; pumps; lined tanks. American Hard Rubber Co.

474 Special Blast Cleaning—Photos and schematic drawings are used in 34-pp Catalog 105-D to show how airless blast cleaning, air blast cleaning and wet blast cleaning has been employed in specific applications. Short case histories relate the experiences of more than 50 companies in solving special cleaning problems. Wheelabrator Corp.

476 Fly Ash Collector—This 6-pp bulletin describes the "LR," a fly ash collector for efficient fly ash prevention on small boiler installations of limited draft. Collection efficiences are shown on graph and size selection and critical dimension data are given in tabulated form. Buell Engineering Co., Inc.

478 Refrigeration Condensers—Engineering data on a complete range of sizes and types of refrigeration condensers are featured in 38-pp Bulletin RC-2. Ratings in tons refrigeration are tabulated for large and small ammonia condensers, vertical ammonia condensers, ammonia condensers-towers, freon condensers and freon condensers-towers. Selection data included. Henry Vogt Machine Co.

480 Neoprene Design Book—This illustrated Bulletin discusses the properties of Neoprene, showing how they

Worn cast iron paper stock pump

...repaired with Ni-Rod "55" electrode

...goes right back on the job

New "lease on life" for iron castings with Ni-Rod "55" electrode

When workers at Austell Box Board Corp. in Georgia pulled this cast iron slurry pump for inspection, they found the inner shell (above left) chewed up by abrasion, with finger-size cracks and gouges.

Scrap it? Not on your life. Down at Austell, they *repair* iron castings. Do it easily with Ni-Rod "55"* electrode.

First, surfaces are thoroughly cleaned. Then cracks and worn areas are filled with Ni-Rod "55". Use of metal arc process enables the welder to operate in close quarters without difficulty.

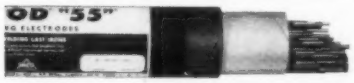
No pre-heat or post heat is needed. Slag chips off easily after each pass. In a short time the pump's back on the job.

The International Nickel Company, Inc.

Helpful booklet answers many welding questions

"A Handy Guide to Welding Cast Irons" illustrates the many different repair jobs you can do with Ni-Rod "55". It also covers technical data and gives helpful welding tips. For your copy, just write Inco. *Registered trademark

INCO 67 Wall Street, New York 5, N. Y.



INCO WELDING PRODUCTS

ELECTRODES • WIRES • FLUXES

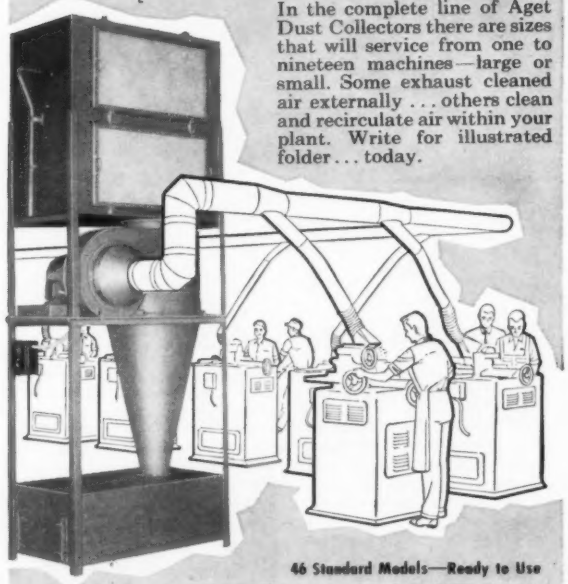
For more facts circle 682 on Reply Card

---

just **ONE** DUSTKOP STOPS DUST

heavy duty unit services up to 19 MACHINES

In the complete line of Aget Dust Collectors there are sizes that will service from one to nineteen machines—large or small. Some exhaust cleaned air externally . . . others clean and recirculate air within your plant. Write for illustrated folder . . . today.



46 Standard Models—Ready to Use

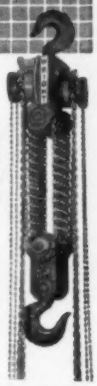
AGET manufacturing company

1388 Church Street • Adrian, Michigan

For more facts circle 683 on Reply Card

WRIGHT SAFEWAYS

Your Best Buy for Rigging and Maintenance Work



12 Sizes
½-ton to 50 tons

Bulletin 412A gives complete details on the many outstanding features that make Wright Safeways your best buy for long, trouble-free life. Write York, Pa. for your copy.

Some Safeway Features

Load Chain is finest alloy, every foot proof-tested...heat treated for hard wear-resistant working surface...ductile to withstand shock loads..."wick" lubricated...anti-rust zinc coat.

Load and Idler Sheaves rotate on life-lubricated, antifriction bearings...minimum of 5 pockets in Big Sheaves for efficiency and long life.

Gears, Pinions, Drive Spindle (also top and bottom Hooks) are nickel-chrome-molybdenum alloy steel mounted on heavy-duty, antifriction bearings. *Gear Train* is enclosed in oil-tight chamber.

Load Brake is Weston type, silent, dependable.

Steel Housing fully protects vulnerable parts.

Wright Hoist Division
AMERICAN CHAIN & CABLE
ACCO

York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

For more facts circle 684 on Reply Card

LeTourneau Jib Cranes, from 3 to 15 tons, provide precise materials handling indoors or out. The 25-ft. boom serves 1926 sq. ft. of floor or ground area, swings in a full 360-degree circle, handles full capacity at any point within its full length. Available with manual or power rotation pillar or base mounted. All-welded steel construction assures strength and safety.

Write for literature today to R. G. LeTourneau, Inc., Industrial Equipment Division, 2804 South MacArthur, Longview, Texas.

R.G. LETOURNEAU INC

LONGVIEW, TEXAS

F-122

For more facts circle 680 on Reply Card

Is your life worth $7.95?

FOOLPROOF PROTECTION FOR YOUR FAMILY AND PROPERTY — *AUTOMATICALLY!*

ONLY **$7.95**

- Plug into any 110 V. A.C. outlet - No Batteries - No Maintenance - No Wasted Current.
- Ullman Guarantee
- BLASTS WARNING
- TAMPER PROOF
- CANNOT FAIL

RUSH me ..... FIRE SPIES at your special low price of only $7.95 each.

Name ..... Company .....

Address ..... City ..... State .....

☐ INDIVIDUAL ORDER — Kindly send check . . . we'll pay postage!

☐ INDUSTRIAL ORDER — Simply send your purchase form with order.

ULLMAN DEVICES CORPORATION • NORWALK, CONNECTICUT

For more facts circle 685 on Reply Card

are utilized in products made from this chemical rubber. Covers its toughness, hardness range, air retention, performance under load, at extreme temperatures. Elastomers Div., E. I. du Pont de Nemours & Co.

481 Humidification For Profit—Sixteen-pp Bulletin 500 presents data showing how relative humidity affects hygroscopic materials, health and comfort, and formation of static electricity. Schematic diagrams and sectional drawings demonstrate operation of electrically and air operated steam humidifiers. Armstrong Machine Works.

482 Heat Exchanger Tubing—Cited in this 30-pp catalog are typical cases where cupro-nickel or Monel tubing installed in heat exchangers resulted in substantial savings and better efficiency through longer tube life. Describes applications of this tubing in various instances where unusual water conditions, as to pollution, excessive turbulence, temperature and the like, required such tubing. The International Nickel Co., Inc.

483 Cooling System Treatment—Bulletin C1 describes advantages of company's treatment for cooling tower systems with synergised polyphosphates. Details of the cooling system treatment are fully covered in bulletin. National Aluminate Corp.

484 Products and Services—Bulletin GSP-901, 24 pp, describes products and services of this company and its various divisions. These include ring balance instruments, components for control systems, electronic devices, force measuring devices, water and steam treatment and testing equipment, chemical products for boiler water and steam conditioning, reagents, and a variety of products for water conditioning, food processing, paper processing, etc. Hagan Chemicals & Controls, Inc.

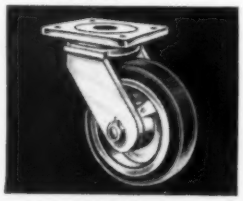
487 Shop Equipment—Work benches, tool stands, shelving and other pressed steel shop equipment for shop, laboratory and assembly line are shown in 8-pp Form 2299. Construction features and specifications of size, bench top material and equipment variations offered are given in photos and text. Standard Pressed Steel Co.

Confused?

. . . about CASTERS?

Let Hamilton, with over half a century of manufacturing know-how, help you make the right selection. Whether it's our famous Air-Flo Caster shown below, or one of the more than 200 types and sizes in the Hamilton line . . . chances are there's a Hamilton caster specifically designed to meet your exact requirements—each job-engineered and job-rated to provide years of trouble-free service.

Get acquainted with the Hamilton line! Write today for your file copy of the Hamilton Caster Catalog, and the name of your nearest Hamilton representative.



THE HAMILTON CASTER AND MFG. CO.
1774 DIXIE HIGHWAY
HAMILTON, OHIO

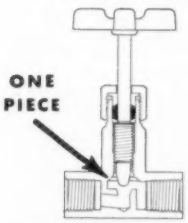
For more facts circle 686 on Reply Card

MARSH
Needle Valves

MAXIMUM WORKING PRESSURE 10,000 PSI

. . . for finer regulation of water, oil or gas

First needle valve to combine all the characteristics called for in modern industry. Embodies sturdiest basic construction—machined from solid bar stock—suitable for pressures to 10,000 psi and equally efficient in lower range. Note stem guide fused to body by new "Conoweld" process, eliminating faults of conventional two-piece valves. Stem 416 stainless steel. Stem threads fine pitch for strength and micrometer regulation. Body electro-zinc plated. Sizes ⅛" to 1", globe and angle patterns.



Ask for new Needle Valve Catalog

MARSH INSTRUMENT CO. *Sales Affiliate of Jas. P. Marsh Corp.* **Dpt.W, Skokie, Ill.**
Marsh Instrument & Valve Co. (Canada) Ltd., 8407 103rd Street, Edmonton, Alberta, Canada

For more facts circle 687 on Reply Card

Black & Decker TOOL OWNERS AGREE

Let the men who make 'em—fix 'em!

Swifty Service says:
"Local Black & Decker Factory Branch Service means longer life, better performance for your B&D Tool!"

Free Tool Inspection
Standard B&D Guarantee

Look under *Tools-Electric* in *Yellow Pages* or write us for address of nearest Factory Service Branch. THE BLACK & DECKER MFG. CO., Dept. S1704, Towson 4, Md.

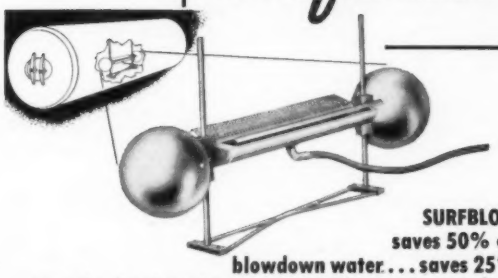
Look Under "TOOLS-ELECTRIC" in Yellow Pages

B&D *Black & Decker*®
QUALITY ELECTRIC TOOLS

For more facts circle 688 on Reply Card

For Sensational Savings in the Cost of Generating Steam

SurfBlow® THE FLOATING SKIMMER



SURFBLOW saves 50% on blowdown water. . . saves 25% on water treatment costs . . . amazing savings on fuel.

SURFBLOW removes boiler water impurities at point of greatest concentration. Removes more solids than conventional methods. Steam is cleaner . . . less carryover.

Nothing to wear out, no moving parts, no maintenance. Stainless Steel Skimmer. Easy to install. Operation completely automatic.

Ask for case histories. ***Write for bulletin today***

BOILER SPECIALTIES CORPORATION — 74-Box 485 GARY, INDIANA

For more facts circle 689 on Reply Card

Handling Coil

CHECK THESE
C-F Lifter
ADVANTAGES

- 1 Lifter handles wide range of coil sizes
- Requires minimum of only 10" to 12" between piles — saves storage room
- 1 man operation — eliminates hookers
- Positive grip on coil—no damage to material

• C-F Coil Lifters are saving time and labor in many plants and warehouses because they can pick up, carry and set down a coil of steel faster and safer than any other method. Infinite jaw openings permit handling a very wide range of coil widths . . . carrying legs open fast, stay open until operator closes them on coil. Narrow legs require minimum space between piles —a space saving advantage. Made in motorized models for crane cab or pendant operation as well as manual types with chain wheel, in capacities from 3 tons up. Powered Rotating Heads available. Opening ranges to suit your requirements.

Write for illustrated Bulletin.

CULLEN-FRIESTEDT CO.
1317 South Kilbourn Avenue • Chicago 23, Illinois

For more facts circle 690 on Reply Card

ADVERTISERS IN THIS ISSUE

When writing to advertisers please tell them you saw their ad in Plant Engineering — or send us the number directly below ad — use the post card in "Bulletin Insert."

ADAMS COMPANY, INC., R. P. 236
Agency—Melvin F. Hall Adv. Agency, Inc.

AGET MANUFACTURING CO. 245
Agency—Slayton-Racine, Inc.

AIR PREHEATER CORPORATION 16
Agency—G. M. Basford Co.

ALAN WOOD STEEL CO. 181
Agency—Doremus-Eshleman Co.

ALLOY STEEL PRODUCTS CO. 76
Agency—James Thomas Chirurg Co.

ALUMINUM COMPANY OF AMERICA 24
Agency—Fuller & Smith & Ross, Inc.

ALUMINUM COMPANY OF AMERICA 57, 223
Agency—Ketchum, MacLeod & Grove, Inc.

AMERACE CORPORATION
AMERICAN HARD RUBBER DIV. 178
Agency—W. L. Towne, Adv.

AMERCOAT CORPORATION 240
Agency—Anderson-McConnell Adv. Agency

AMERICAN AIR FILTER CO. 52-53
Agency—Zimmer-McClaskey

AMERICAN BRIDGE DIVISION
UNITED STATES STEEL CORP. 141
Agency—Batten, Barton, Durstine & Osborn, Inc.

AMERICAN CHAIN & CABLE CO.
WRIGHT HOIST DIVISION 28-29, 245
Agency—Reincke, Meyer & Finn, Inc.

AMERICAN ENGINEERING COMPANY 243
Agency—Hazard Adv. Co.

AMERICAN HOIST & DERRICK CO. 221, 242
Agency—Erwin Wasey, Ruthrauff & Ryan, Inc.

AMERICAN PULLMAX CO., INC. 228
Agency—Grimm & Craigle, Inc.

ANDERSON COMPANY, V. D. 206
Agency—Will Incorporated

APPLETON ELECTRIC COMPANY 189
Agency—Kencliffe, Breslich & Co.

ARMSTRONG MACHINE WORKS 63
Agency—Russell T. Gray, Inc.

AURORA PUMP DIVISION
THE NEW YORK AIR BRAKE CO. 240
Agency—Fred A. Hinrichsen Advertising Agency

BASSICK COMPANY 227
Agency—James Thomas Chirurg Co.

BAYLEY BLOWER COMPANY 184
Agency—Barnes Adv. Agency

BELL & GOSSETT COMPANY 135
Agency—Perrin-Paus Company

BETZ LABORATORIES, INC. 33
Agency—The Michener Company

BLACK & DECKER MFG. CO. 229, 247
Agency—VanSant, Dugdale & Co., Inc.

BOILER ENGINEERING & SUPPLY CO. 84
Agency—William Jenkins, Advertising

BOILER SPECIALTIES CORP. 247
Agency—Kreicker & Meloan, Inc.

BUELL ENGINEERING COMPANY 239
Agency—Hicks & Greist, Inc.

BUFFALO FORGE COMPANY 61
Agency—Melvin F. Hall Adv. Agency

BYERS COMPANY, A. M. 3
Agency—Ketchum, MacLeod & Grove, Inc.

C&D BATTERIES, INC. 86
Agency—John T. Hall & Company

CHEMICAL & POWER PRODUCTS, INC. 244
Agency—Spooner & Kriegel

CLARAGE FAN COMPANY 191
Agency—McLain & Associates, Adv.

CLEAVER-BROOKS COMPANY 201
Agency—Klau-Van Pietersom-Dunlap, Inc.

CLEVELAND TRAMRAIL DIVISION
CLEVELAND CRANE & ENGINEERING CO. 66

COLORADO FUEL & IRON CORP. 205
Agency—Doyle, Kitchen & McCormick, Inc.

COLUMBUS McKINNON CHAIN CORP. 35
Agency—Comstock & Company

COPE DIVISION, T. J.,
ROME CABLE CORPORATION 198
Agency—Roland G. E. Ullman Org.

CORNING GLASS WORKS 175
Agency—Rumrill Company, Inc.

CORRULUX DIV. OF LOF GLASS FIBERS 156
Agency—Rives, Dyke & Company

CRANE CO. 149
Agency—The Buchen Company

CROUSE-HINDS COMPANY 39
Agency—Barlow Adv. Agency, Inc.

CULLEN-FRIESTEDT, INC. 247
Agency—Ross Llewellyn, Inc.

CUTLER-HAMMER, INC. ..... Back Cover
Agency—Kirkgasser-Drew

DARLING VALVE & MFG. CO. 196
Agency—Griswold-Eshleman Co.

DAY COMPANY 194
Agency—Scrymiger & Osterholt

DEMING COMPANY 180
Agency—G. M. Basford Company

DIAMOND CHAIN COMPANY 46
Agency—Kirkgasser-Drew, Adv.

DODGE MANUFACTURING CORP. 152, 153
Agency—Lamport, Fox, Prell & Dolk, Inc.

DOLLINGER CORPORATION 203
Agency—Hutchins Adv. Agency

DU PONT DE NEMOURS & CO., E. I. 133, 183
Agency—N. W. Ayer & Son, Inc.

DU PONT DE NEMOURS & CO., E. I. 171, 177
Agency—Batten, Barton, Durstine & Osborn, Inc.

DURAMETALLIC CORPORATION 234
Agency—Odgen, Adv.

EDISON INDUSTRIES, THOMAS A. 37
Agency—Gaynor & Ducas, Inc.

ERIE CITY IRON WORKS 8-9
Agency—Davies & McKinney

ESSO STANDARD OIL CO. 139
Agency—McCann-Erickson, Inc.

FAULTLESS CASTER CORPORATION 185
Agency—Perrin-Paus Company

FEEDRAIL CORPORATION 60
Agency—Marsteller, Rickard, Gebhardt & Reed, Inc.

FISKE BROTHERS REFINING COMPANY
LUBRIPLATE DIVISION 32
Agency—E. M. Freystadt Associates, Inc.

FLEXIBLE TUBING CORPORATION 172
Agency—Wilson, Haight, Welch & Grover, Inc.

FOSTER, COMPANY, L. B. 238
Agency—Lando Adv. Agency

FOSTER WHEELER CORPORATION 71
Agency—Marsteller, Rickard, Gebhardt & Reed, Inc.

GARDNER-DENVER COMPANY 62, 168, 169
Agency—The Buchen Company

GARLOCK PACKING COMPANY 145
Agency—Hutchins Adv. Company, Inc.

GENERAL CABLE CORPORATION 51
Agency—Hicks & Greist, Inc.

GENERAL ELECTRIC COMPANY
APPARATUS DIVISION 12-13, 68-69, 155
Agency—G. M. Basford Company

GENERAL ELECTRIC COMPANY
LAMP DIVISION 70
Agency—Batten, Barton, Durstine & Osborn, Inc.

GENERAL ELECTRIC COMPANY
TUBE DEPARTMENT 67
Agency—Maxon, Inc.

GENERAL RADIO COMPANY 213
Agency—K. E. Morang Company

GODER INCINERATORS, JOSEPH 228
Agency—Burlingame-Grossman, Adv.

GOODRICH COMPANY, B. F. 137
Agency—Griswold-Eshleman Company

GOODYEAR TIRE & RUBBER CO. 1
Agency—Kudner Agency, Inc.

GOULDS PUMPS, INC. 200
Agency—Rumrill Company, Inc.

GRINNELL COMPANY, INC. 5
Agency—Noyes & Company

GROBAN SUPPLY COMPANY 228
Agency—Louis Block Adv. Agency

GULF OIL CORPORATION 65
Agency—Ketchum, MacLeod & Grove, Inc.

HAGAN CHEMICALS & CONTROLS, INC. 243
Agency—Ketchum, MacLeod & Grove, Inc.

HAMILTON CASTER & MFG. CO. 246
Agency—Rossi & Company

HARNISCHFEGER CORPORATION 146
Agency—Hoffman & York, Inc.

HERCULES POWDER COMPANY 195
Agency—Fuller & Smith & Ross, Inc.

HOBBS CORPORATION, JOHN W. 238
Agency—Mace Adv. Agency, Inc.

HUNTINGTON LABORATORIES, INC. 232
Agency—Bonsib Adv. Agency

INDUSTRIAL CRANE & HOIST
BORG-WARNER CORPORATION 45
Agency—Paxson Adv., Inc.

INLAND STEEL COMPANY 235
Agency—Edward H. Weiss & Co.

INSUL-8-CORPORATION 238
Agency—Knollin Adv. Agency

INTERNATIONAL MOLDED PLASTICS, INC.
STRUCTOGLAS DIVISION 204
Agency—Howard Swink Adv. Agency

INTERNATIONAL NICKEL CO., INC. 245
Agency—Marschalk Pratt Co., Inc.
Div. of McCann-Erickson

INVINCIBLE VACUUM CLEANER MFG. CO. 85
Agency—Bayless-Kerr Co.

I-T-E CIRCUIT BREAKER COMPANY
SMALL AIR CIRCUIT BREAKER DIV. 10-11
SWITCHGEAR DIVISION 241
Agency—Gray & Rogers

JEFFREY MANUFACTURING COMPANY 179
Agency—Griswold-Eshleman Co.

JENKINS BROS. 143
Agency—Darrell Prutzman Associates

JOHNS-MANVILLE 74
Agency—J. Walter Thompson Co.

JOHNSON SERVICE COMPANY 50
Agency—St. Georges & Keyes, Inc.

JOY MANUFACTURING COMPANY 23
Agency—W. S. Walker Advertising, Inc.

KIRK & BLUM MFG. CO. 192
Agency—Baer, Kemble & Spicer, Inc.

LAMSON CORPORATION 186
Agency—Chapman-Nowak & Associates, Inc.

LENNOX INDUSTRIES, INC. 47
Agency—Biddle Company

LE TOURNEAU, R. G. 246
Agency—D'Arcy Advertising Co.

LINK-BELT COMPANY 25, 167
Agency—Klau-Van Pietersom Dunlap, Inc.

LIQUIDOMETER CORPORATION 182
Agency—O. S. Tyson & Co., Inc.

LOUIS ALLIS COMPANY 6-7
Agency—Hoffman & York, Inc.

LUBRIPLATE DIVISION, FISKE BROS.
REFINING COMPANY 32
Agency—E. M. Freystadt Associates, Inc.

LYON METAL PRODUCTS, INC. 31
Agency—Reincke, Meyer & Finn, Inc.

MACWHYTE COMPANY 165
Agency—Hoffman & York, Inc.

MAGNAFLUX CORPORATION 243
Agency—Stoetzel & Associates, Inc.

MAHON COMPANY, THE R. C. 173
Agency—Anderson, Inc.

MANNING, MAXWELL & MOORE, INC. 237
Agency—Fuller & Smith & Ross, Inc.

MARSH INSTRUMENT CO. 247
Agency—Kreicker & Meloan, Inc.

MASTER BUILDERS COMPANY 242
Agency—Bayless-Kerr Company

MISSISSIPPI GLASS COMPANY 208
Agency—Ralph Smith Adv. Agency

NATIONAL ELECTRIC PRODUCTS CORP. 151
Agency—Ketchum, MacLeod & Grove, Inc.

NEW ENGLAND CARBIDE TOOL CO., INC. 226
Agency—Silton Brothers, Callaway, Inc.

NEW YORK BLOWER COMPANY 212
Agency—Jack Mathis, Adv.

NIAGARA BLOWER COMPANY 234
Agency—The Moss-Chase Co.

NORGREN COMPANY, C. A. 44
Agency—Galen E. Broyles Co., Inc.

NORTH AMERICAN MOGUL PRODUCTS 197
Agency—Ritchie & Sattler, Inc.

PANGBORN CORPORATION 147
Agency—VanSant, Dugdale & Co., Inc.

PARTLOW CORPORATION 176
Agency—Moser & Cotins, Division of the Rumrill Co., Inc.

PATENT SCAFFOLDING CO., INC. 250
Agency—Stoetzel & Associates, Inc.

PENNSYLVANIA FLEXIBLE METALLIC TUBING CO. 34
Agency—A. E. Aldridge Associates

PITTSBURGH COKE & CHEMICAL CO. 49
Agency—W. S. Walker Adv., Inc.

PITTSBURGH CORNING CORPORATION 233
Agency—Ketchum, MacLeod & Grove, Inc.

POWELL CO., THE WILLIAM 209
Agency—Ralph H. Jones Company

PROPELLAIR DIVISION ROBBINS & MYERS, INC. 216
Agency—Weber, Geiger & Kalat, Inc.

PUROLATOR PRODUCTS, INC. 164
Agency—G. M. Basford Company

RADIANT LAMP CORPORATION 64
Agency—Joseph S. Vogel & Company

RADIATOR SPECIALTY COMPANY 230
Agency—Bennett-Evans Company

RAMSET FASTENING SYSTEM 188
Agency—Fuller & Smith & Ross, Inc.

READING CRANE & HOIST CORP. 158
Agency—Beaumont, Heller & Sperling, Inc.

RELIANCE STEEL PRODUCTS CO. 174
Agency—Bond & Starr, Inc.

REMINGTON ARMS CO., INC. 157
Agency—Batten, Barton, Durstine & Osborn, Inc.

RESISTOFLEX CORPORATION 231
Agency—Marsteller, Rickard, Gebhardt & Reed, Inc.

RHOADS & SONS CO., J. E. 55
Agency—William Jenkins, Adv.

RICHARDS-WILCOX MFG. CO. 211
Agency—Connor Associates, Inc.

RIDGE TOOL COMPANY 216
Agency—Carr Liggett Adv., Inc.

ROBBINS & MYERS, INC. 142
Agency—Odiorne Industrial Adv.

ROBBINS & MYERS, INC. 20
Agency—Weber, Geiger & Kalat, Inc.

ROBERTSON & CO., H. H. 210
Agency—Bond & Starr, Inc.

ROCKBESTOS PRODUCTS CORP. 207
Agency—Sutherland-Abbott, Adv.

ROCKWELL COMPANY, W. S. 214
Agency—Spooner & Kriegel

ROCKWELL MFG. COMPANY 59
Agency—Marsteller, Rickard, Gebhardt & Reed, Inc.

ROME CABLE CORPORATION 131
Agency—Rumrill Company, Inc.

RUST-OLEUM CORPORATION 83
Agency—O'Grady-Andersen-Gray, Inc.

SARCO COMPANY, INC. 199
Agency—G. M. Basford Co.

SCHRAMM, INC. 162
Agency—Harris D. McKinney, Inc.

SEXAUER MFG. CO., INC., J. A. 232
Agency—Lawrence Peskin, Inc.

SKF INDUSTRIES, INC. 144
Agency—G. M. Basford Company

SKIL CORPORATION 14-15
Agency—Fuller & Smith & Ross, Inc.

SLY MFG. COMPANY, W. W. 154
Agency—Bayless-Kerr Company

SOLO ELECTRIC COMPANY 230
Agency—Sidney Clayton & Assoc.

SPENCER TURBINE COMPANY 150
Agency—William Schaller Co., Inc.

SQUARE D COMPANY ..... Second & Third Cover
Agency—Reincke, Meyer & Finn, Inc.

STANDARD ELECTRIC TIME CO. 48
Agency—William Schaller Co., Inc.

STANDARD OIL CO. (INDIANA) 75
Agency—D'Arcy Advertising Company

STANDARD PRESSED STEEL CO. 36
Agency—Gray & Rogers

STRUCTOGLAS DIVISION OF INTERNATIONAL MOLDED PLASTICS, INC. 204
Agency—Howard Swink Adv. Agency

SUGAR BEET PRODUCTS CO. 202
Agency—Crawford-McNellis, Inc.

SUN OIL COMPANY 41
Agency—Erwin Wasey, Ruthrauff & Ryan, Inc.

SWARTWOUT COMPANY 166
Agency—Carr Liggett Adv., Inc.

SYLVANIA ELECTRIC PRODUCTS, INC. 159
Agency—J. Walter Thompson Co.

TEMPLETON, KENLY & COMPANY 58
Agency—Stoetzel & Associates, Inc.

THOMAS FLEXIBLE COUPLING CO. 4
Agency—Reinhold C. Ferster, Adv.

TITUSVILLE IRON WORKS CO. 170
Agency—Downing Industrial Adv., Inc.

TRANE COMPANY 72-73
Agency—Campbell-Mithun, Inc.

TUBE TURNS PLASTICS, INC. 43
Agency—Griswold-Eshleman Co.

ULLMAN PRODUCTS 246
Agency—Van Lear Woodward Associates, Inc.

U. S. ELECTRICAL MOTORS, INC. 163
Agency—The McCarty Company

U. S. HOFFMAN MACHINERY CORP. 225
Agency—Mohr Associates, Inc.

UNITED STATES STEEL CORP. 141, 187
Agency—Batten, Barton, Durstine & Osborn, Inc.

VIKING PUMP COMPANY 236
Agency—Wesley Day & Company

VOGT MACHINE CO., HENRY 193
Agency—Farson, Huff & Northlich

WALWORTH 30
Agency—G. M. Basford Company

WESTINGHOUSE ELECTRIC CORP. ..... 18-19, 79 thru 82
Agency—Fuller & Smith & Ross, Inc.

WESTINGHOUSE ELECTRIC CORP. LAMP DIV. 140
Agency—McCann-Erickson, Inc.

WHITNEY BLAKE COMPANY 42
Agency—J. Roy McLennan

WHITNEY CHAIN COMPANY 190
Agency—Van Lear Woodward Associates, Inc.

WICKWIRE SPENCER STEEL DIV. OF CF&I 205
Agency—Doyle, Kitchen & McCormick, Inc.

WIEGAND COMPANY, EDWIN L. 160-161
Agency—Ketchum, MacLeod & Grove, Inc.

WING MFG. COMPANY, L. J. 26-27
Agency—Michel-Cather, Inc.

WRIGHT HOIST DIVISION AMERICAN CHAIN & CABLE CO. 28-29, 245
Agency—Reincke, Meyer & Finn, Inc.

YALE & TOWNE MFG. CO. 215
Agency—Erwin Wasey, Ruthrauff & Ryan, Inc.

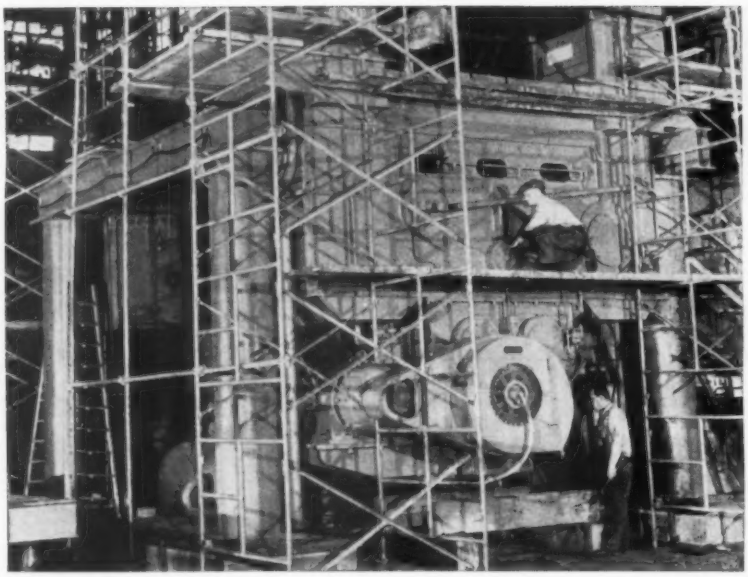
YARNALL-WARING COMPANY 17, 249
Agency—The Michener Company

a good team for steam

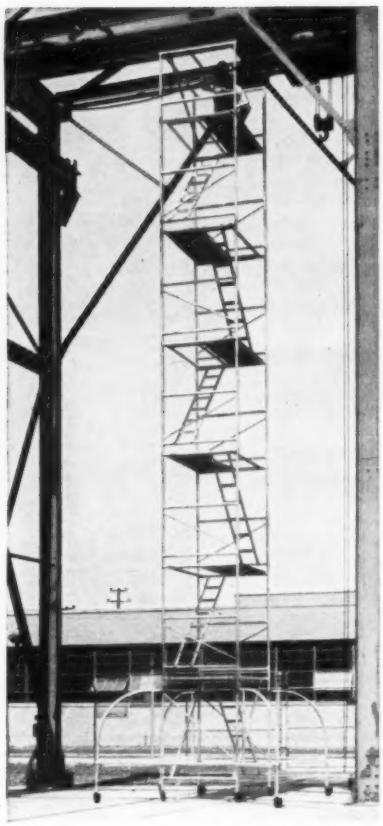
This Yarway team has scored high—over a million installed on all types of steam equipment. Stocked and sold by 270 Industrial Distributors. For free Steam Trap Book, write YARNALL-WARING CO., 145 Mermaid Ave., Philadelphia 18, Pa.

go YARWAY with confidence

For more facts circle 691 on Reply Card



GIANT PRESS DRY-RUN—To speed a "dry-run" on this huge metal press built by Alco Products, Inc., Schenectady, N.Y., "Trouble Saver"® Steel Scaffolding mason frames with patented SlideLoks, front, and "TubeLox"® tube and coupler Steel Scaffolding at sides and rear give assembly and testing crews safe, sturdy working platforms. Versatile "TubeLox" Scaffolding, even though it consists of only four basic parts, is used to scaffold plant structures of any shape, size or contour. Prefabricated "Trouble Saver" Scaffolding frames, in a wide choice of styles and sizes are joined by pivoted, diagonal braces to give various spacings.



GETTING UP TO A CRANE—The Public Service Electric & Gas Co., Bergen County Switching Station, N. J., uses a 36'9½"-high Model B Aluminum Sectional Rolling Scaffold, with outrigger supports, to repair a crane. These and other PS Co. rolling and stationary scaffolds, extension and platform ladders, "Midget"® and "Junior"® Safety Swinging Scaffolds, help speed-up off-the-ground jobs.

How To Save Money . . .

By Moving Men to Work With Safety

MOVING MEN and materials with more speed and greater safety to exact job locations is an ever increasing requirement in many of today's plants. Modern steel and aluminum scaffolding is performing this task with substantial savings in time and money . . . and with utmost safety.

Because these scaffolds are quickly erected and moved, workers perform their duties in less time, which results in more productive manhours. Greater efficiency is obtained, as men work with more confidence on stronger, safer platforms. Being able to reach exact job areas, regardless of height, shape or size, from versatile, modern scaffolds helps increase production rates and reduce costs. Completely re-usable, interchangeable parts provide substantial equipment savings. Easily-dismantled, compact units require little storage space.

These are the reasons why many smart management teams are getting their men to work with safer, modern scaffolding in plant production, maintenance and repair operations.

It would pay you to get the facts on how modern PS Co. Scaffolding and Ladders can help you speed up your plant operations with utmost safety. PS Co. offers complete engineering service available locally. See the Yellow Pages of your telephone directory for the name of the nearest Patent Scaffolding Company office or representative that sells or rents "Gold Medal"® Scaffolding and Ladders. A free consultation may save you many dollars. For more information write for Bulletin G-205R.

FOR GREATER SAFETY...EFFICIENCY...ECONOMY

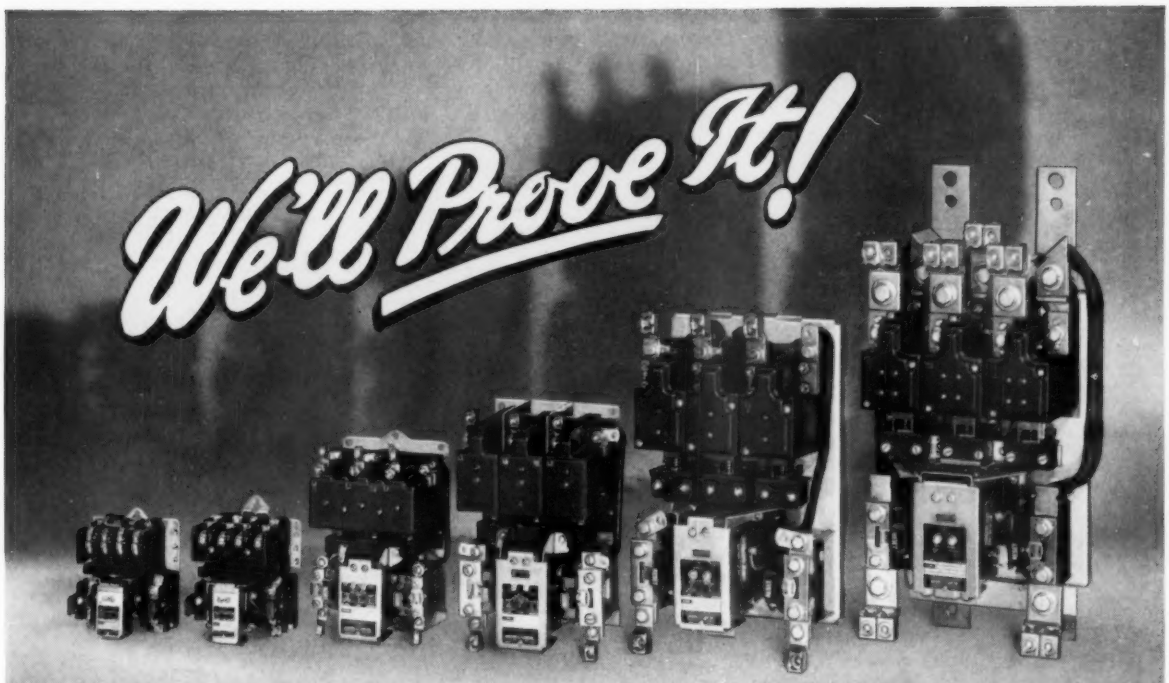
GOLD MEDAL LADDERS SCAFFOLDING ®

THE PATENT SCAFFOLDING CO., Inc.

38-21 12th Street, Dept. PE, Long Island City 1, N. Y.

• 1550 Dayton St., Chicago 22, Ill. • West Coast: 6931 Stanford Ave., Los Angeles 1, Calif.
• In Canada: 355 Dufferin St., Toronto *Branches in all Principal Cities*

For more facts circle 692 on Reply Card



Square D Vertical Action Magnetic Starters Sizes 0, 1, 2, 3, 4 and 5

ONLY SQUARE D GIVES YOU ALL 5

1 *QUICK* INSTALLATION!

No groping or fumbling. Square D gives you lots of wiring space, plenty of knockouts, handy and clearly marked pressure wire connectors.

2 *TOP* PERFORMANCE!

No needless downtime from coil burnout, mechanical binding, contact freezing. Square D gives you an extra-capacity magnet with a tough and cool-operating encapsulated coil to handle additional poles and interlocks—a guided single moving part—big silver cadmium-oxide contacts with strong finger springs—arcing yokes on larger sizes.

3 *REAL* OVERLOAD PROTECTION!

No change in trip characteristics because of mismatched parts supplied separately for field assembly, no distortion of heater in installation. Square D gives you melting alloy unit construction—factory-assembled and individually tested for bull's-eye accuracy. Also bi-metal and magnetic designs for automatic reset or adjustable trip applications.

4 *EASY* INSPECTION and MAINTENANCE!

No starter is "maintenance-free." But Square D makes the job easy. Inspection is a breeze. You don't have to remove wiring for contact replacement or take the starter out of the enclosure to change coils.

5 *WIDE-RANGE* ADAPTABILITY!

No need for excessive inventories to avoid costly waiting for non-standard arrangements. Square D provides "off-the-shelf" kits for changing contacts and coils, adding pushbuttons, selector switches, and up to 4 double-throw auxiliary circuits.

Send for the COMPLETE Story!

Square D Company, Dept. 22,
4041 North Richards Street, Milwaukee 12, Wisconsin

Please send me your new bulletin with detailed proof that Square D offers me my best starter investment.

Name_____

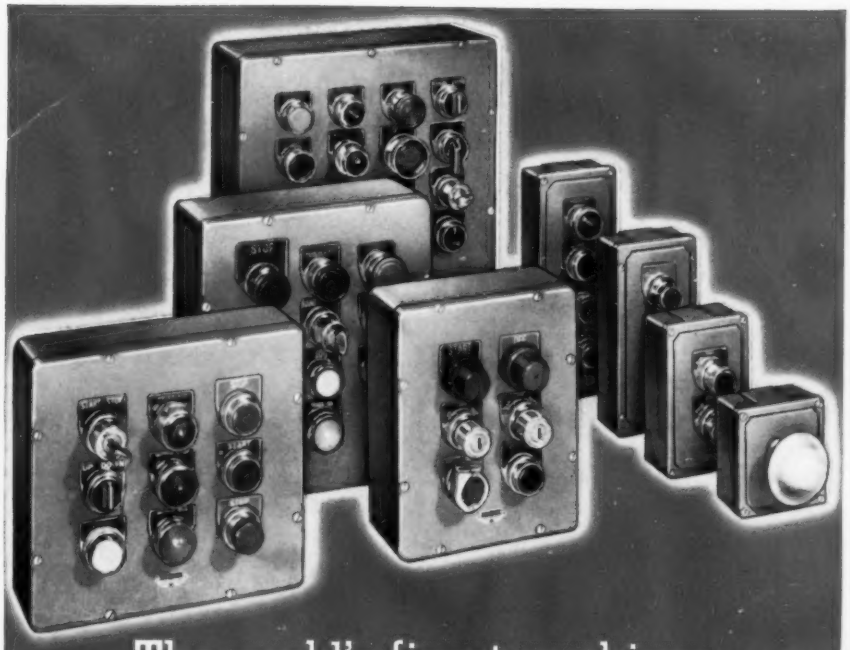
Company_____

Address_____

City_____ Zone____ State_____

SQUARE D COMPANY

For more facts circle 693 on Reply Card



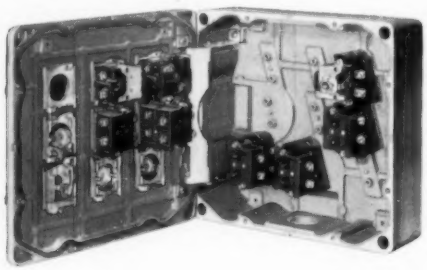
The world's finest machines are controlled from Cutler-Hammer oil-tight pushbutton Control Stations

The Cutler-Hammer line of heavy duty oil-tight pushbuttons and precision die-cast control stations surpass anything ever before available to serve the needs of machine design engineers. Cutler-Hammer Oil-Tight Control Stations are precision die-castings to permit both base and one-hole mounting of the control units. The one to four element control stations are available in either the normal depth or the exclusive shallow depth for use where space limitations are critical.

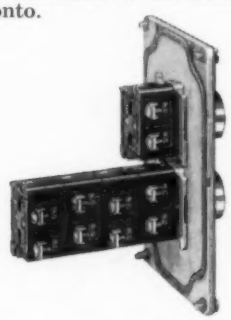
Cutler-Hammer Pushbutton contact blocks are easily tandem mounted without special adapters, and use less behind-the-panel space than any other. Circuits can be arranged in any combination of NO and NC contacts.

Indicating lights come in a wide selection of colors with either plastic or glass lenses. Among the many special operators are: Roto-Push®, the combination pushbutton-selector switch; PresTest®, the self-testing indicating light; knob, key, lever, and coin type selector switches; flush, long, mushroom head, guarded, and palm type pushbutton operators.

For further information, write on your company letterhead for the C-H Master Design, Publication EL-178. . . . CUTLER-HAMMER Inc., 1447 St. Paul Ave., Milwaukee 1, Wis. Associate: Canadian Cutler-Hammer Ltd., Toronto.

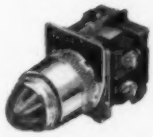


The hinged cover on the larger Oil-Tight Control Stations facilitates assembly and alterations. Precision die-castings permit both base and one-hole mounting of the control units. Raised edge on the box mates with the neoprene-cork cover gasket for a perfect seal.



Complete line of cover plates for cavity mounting. Compact contact blocks take 40% less space behind the panel than the next smaller element . . . additional blocks easily tandem mounted . . . from 2 to 8 separate circuits in any combination of NO or NC contacts.

Special Purpose Operators and Accessories



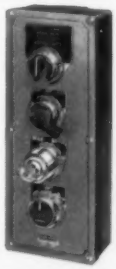
PresTest—the self-testing indicating light

Guarded mushroom head operator

Neoprene protective boot for flush or long button operators

Indicating lights, six colors available with plastic or glass lenses

Roto-Push—the one button control station . . . with or without lever ring in a deep precision die-cast enclosure



Selector switches—knob, lever, key, coin

CUTLER·HAMMER
MOTOR CONTROL
C-H

For more facts circle 694 on Reply Card

MAY, 1958

Plant Engineering

IN THIS ISSUE

Dip Tank Doubles in Color 104
Is Your Plant Heating Below Par?
I. Here's How To Find Out 105
Controlling Air Pollution 110
Coordinating a Master Building Plan 113
Portrait of a Plant Engineer 115
Fire-Fighting Cart—Ready for Pick-Up 119
Equipment Use Governs Cost—
Permanent, Versatile or Temporary, Specialized 120
Servicing the Solenoid—
Basic Theory Helps You Understand Failures 122
Lathes Modified To Resurface Rolls 127
Two-Way Radios, Survival Gear, Parkas—
Northland's "Tools of Maintenance" 128
Fuel Change Lowers Furnace Operating Costs 131
Publications of Building Research Institute 132
A Nest for the Big Bird—Atlas ICBM 134
Fire Brigade Sharpens Up in Competition 137
Here's the Case for Mastic Paints 138
Radio Leasing for Transportation Fleet 141
How To Control Project Costs 142
This Basement Must Be Dry To Protect Computer 146
Rubber With a Magnetic Quality 147
These Materials Handling Ideas Save Time, Steps 148
How To Get What You Need in Pumps
V. Smaller Parts, Too, Can Be Selected 150
New North Carolina PE Group Gets Start 154

REGULAR DEPARTMENTS

'Round About With the Editors 2
Bulletins and Catalogs 25
Backtalk and Forethoughts 36
Plant Engineers' Digest 42
Operation and Production 64
Court Decisions 85
What's Just Ahead in This Issue? 103
News from the Plants 174
New Plant Construction 180
New Products and Processes 194
Review of New Books 246
Data File of Commercial Literature 260
Advertisers' Index 284

The magazine that helps plant engineers with their everyday problems

Volume 12, No. 5 Circulation of this issue 51,227